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Pages: 70 Printed: 05-13-08 10:47:48

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ILLiad TN: 1304635

Journal Title: Avatars of Story

Volume:

Issue:

Month/Year: 2006

Pages: 97-165

Article Author: Ryan, Marie-Laure

Article Title: Towards an interactive
narratology

Call #: PN212 .R93 2006

Location: evans

Not Wanted Date: 11/08/2008

Status: Graduate/Professional Student

Phone: 979-260-3068

E-mail: sookkhyun@tamu.edu

Name: Hyun, Sook

Pickup at Evans

3902 College Main #309
Bryan, TX 77801

Cm

5. Toward an Interactive Narratology

In *Cybertext*, a book whose contribution to digital textuality truly deserves to be called ground-breaking, Espen Aarseth attempts to analyze two types of digital texts, hypertext fiction and text-based adventure games (also known as interactive fiction) according to the parameters of what he calls the "communication model of classical narrative" (1997, 93): a transaction involving a real author, an implied author, a narrator, a narratee, an implied reader, and a real reader.¹ He suggests some adjustments, such as redefining the relations between the parameters for hypertext (the author no longer controls the narrator, the reader no longer identifies with the narratee), or renaming the parameters for interactive fiction (intrigue for plot, intrigant for implied author, and intriguee for narratee), but he declares himself unsatisfied with these patches. In his more recent work, Aarseth turned his back on narratology and forcefully rejected the idea that computer games, and by implication interactive fiction, form a species of narrative. Implicit to this move is the belief that existing narratological models are the definitive word on the nature of narrative. But the narrative theory invoked by Aarseth, which we may call "classical narratology" (Herman 1999), was designed for standard written literary fiction based on the illocutionary act of "telling somebody that something happened." The communicative model of classical narratology does not work for the mimetic mode of film and theater, and one should not expect it to describe narrative modes even more removed from the standard case than dramatic enactment.

In contrast to Aarseth, I regard narratology as an unfinished project, and if classical narratology fails the test of interactive textuality, this does not necessarily mean that interactive textuality fails the test of narrativity. It rather means that narratology must expand beyond its original territory. In this chapter I propose to investigate what needs to be done to allow narratology to deal with interactive digital texts. Needless to say, the development of a digital narratology will be a long-term collaborative project, and I can only sketch here what I consider to be its most urgent concerns.

Before embarking on this investigation, let me enumerate the properties of digital systems—other than the fundamental feature of programmability, that is, algorithm-driven operation—that I regard as the most relevant for narrative and textuality:

- Interactive and reactive nature: the computer's ability to take in voluntary or involuntary user input and to adjust its behavior accordingly.
- Volatile signs and variable display: what enables bits in memory to change value, causing pixels on the screen to change color. This property explains the unparalleled fluidity of digital images.
- Multiple sensory and semiotic channels: what makes the computer pass as the synthesis of all other media.
- Networking capabilities: the possibility to connect computers across space, bringing their users together in virtual environments.²

This list focuses on properties inherent to computer systems and therefore avoids features of digital objects that result from the proper exploitation of these properties. This is why it does not include immersivity, a feature that some authors list as distinctive of digital media (for example, Schaeffer 1999, 310). As I argue elsewhere (Ryan 2001), literature, film, and painting can also produce immersive experiences, though the digital medium, thanks to the above-mentioned properties, has taken immersion to new depths. I also restrict my list to features that do not derive automatically from the basic property of programmability and were added only progressively to computer systems. In the early days of computing, users had to key-punch code on cards and feed the stack of cards to a reading machine connected to the computer. An eternity later—or so it seemed—the machine would spit out a striped

white-and-green piece of paper or, more frequently, a list of symbols known as batch processing, lacking the ability to communicate with the machine. The early multimedia capabilities (all the data in numerical text), volatility of information (it was on paper), and networking capabilities (it served multiple users, had no real-time interaction between users communicating among themselves).

Of all the properties listed above, the most important. Not all digital texts can be taken out of their medium.³ The term has been criticized for being too vague, especially when it comes to love with it and started promoting interactivity,⁴ but when interactivity is unambiguous.⁵ As Gregory Bateson serves: "it mandates choice for the user. The choice must give its user a reasonable amount of control. This is not a rule of no interactivity. This is not a rule of compromising principle" (2002, 100).

Yet if interactivity is the property that defines the difference between old and new media, it is because narrative meaning presupposes a linearity of time, logic, and causality. Interactivity involves a nonlinear or multilinear structure, a tree, a rhizome, or a network. Narrative is the product of the top-down planning of a linear structure. Interactivity requires a bottom-up structure. They subsequently take a seamless (some would say a hybrid) of bottom-up input and top-down planning to create narrative patterns. This convergence of a linear structure and a certain kind of nonlinearity will be of course easy to constrain the user's choice. They will always fit into a predefined structure. The aesthetics of interactive narrative demand a structure to give the user a sense of freedom. The structure is sufficiently adaptable to those choices. The structure is generated on the fly. The ideal structure is itself as an emergent story, giving

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white-and-green piece of paper with the output of the program, or, more frequently, a list of syntax errors. This type of system, known as batch processing, lacked interactivity (the user could not communicate with the machine during the run of the program), multimedia capabilities (all the computer could output was alpha-numerical text), volatility of inscription (both input and output were on paper), and networking capabilities (the machine, which served multiple users, had no remote terminals and would not let users communicate among themselves).

Of all the properties listed above, I regard interactivity as the most important. Not all digital texts are interactive, but those that aren't could usually be taken out of the computer and played by another medium.³ The term has been under attack by cybertheorists for being too vague, especially after advertising language fell in love with it and started promoting everything under the sun as interactive,⁴ but when interactivity is associated with narrative, its meaning is unambiguous.⁵ As game designer Chris Crawford observes: "it mandates choice for the user. Every interactive application must give its user a reasonable amount of choice. No choice, no interactivity. This is not a rule of thumb, it is an absolute, uncompromising principle" (2002, 191).

Yet if interactivity is the property that makes the greatest difference between old and new media, it does not facilitate storytelling, because narrative meaning presupposes the linearity and unidirectionality of time, logic, and causality, while a system of choices involves a nonlinear or multilinear branching structure, such as a tree, a rhizome, or a network. Narrative meaning, moreover, is the product of the top-down planning of a storyteller or designer, while interactivity requires a bottom-up input from the user. It will consequently take a seamless (some will say miraculous) convergence of bottom-up input and top-down design to produce well-formed narrative patterns. This convergence requires a certain type of textual architecture and a certain kind of user involvement. It would be of course easy to constrain the user's choices in such a way that they will always fit into a predefined narrative pattern; but the aesthetics of interactive narrative demand a choice sufficiently broad to give the user a sense of freedom, and a narrative pattern sufficiently adaptable to those choices to give the impression of being generated on the fly. The ideal top-down design should disguise itself as an emergent story, giving users both confidence that their

efforts will be rewarded by a coherent narrative and the feeling of acting of their own free will, rather than being the puppets of the designer.

Interactive narratology does not have to be built entirely from scratch, since it involves the same building blocks as the traditional brand: time, space, characters, and events. But these elements will acquire new features and display new behaviors in interactive environments. To account for the pragmatics of the interactive text, it will also be necessary to expand the catalog of modes and to devise alternatives to the classical communication model. In chapter 1 I address this need by proposing a simulative, an emergent, and a participatory mode. Among the issues new to interactive narratology will be the types of architecture that lend themselves to choice without compromising narrative logic, the various modes of user involvement, and the means and types of interaction. Under means I understand such tools as the link, the menu, the map, and simulated real-world objects that interactors can pick up and use, and under types, whether the interaction is blind or purposefully selective, and whether it counts as a concrete action in the virtual world or remains purely abstract. As for the object of interactive narratology, it includes not only "literary" hypertext fiction, but also text-based adventure games (to be discussed in more detail in chapter 6), interactive drama (chapter 7), some single-user video games (which ones, exactly, will be discussed in chapter 8), and multiple-user online role-playing games.

A complete overview of all the expansions of classic narratology required by interactive digital texts would far exceed the frame of this chapter. In the discussion to follow, I will focus instead on what I regard as the most prominent concerns of interactive narratology: the structures of choice (textual architecture), the modes of user involvement (types of interactivity), and the combinations of these parameters that preserve the integrity of narrative meaning.

Textual Architecture

Textual architecture, in both traditional and interactive narrative, is a building composed of a story and a discourse level. Stories (or plots) are mental constructs of such complexity that it will take many different types of two-dimensional diagrams to represent their various dimensions. In Figure 1 I propose four partial representations.

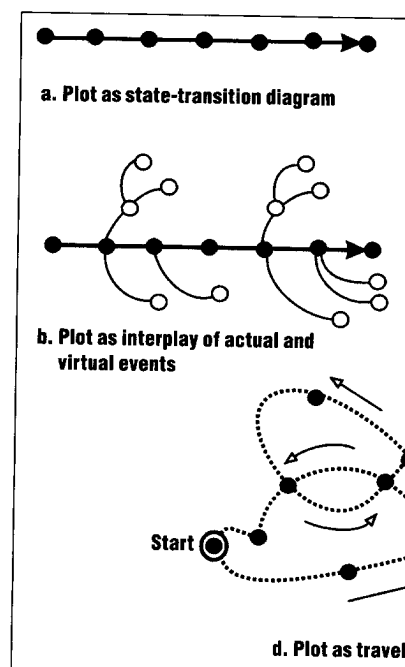


Figure 1. Plot graphs

In all these diagrams, the text is represented as a sequence of events through an oriented line. In Figure 1a, the horizontal axis stands for a timeline, and the dots represent events that change the global state of the narrative. In Figure 1b, the axis could be used for the description of the plotline, and the plotline is reduced to the collection of events that change the state of the narrative, and its representation of events is reduced to the collection of events. But the virtual, that which could not be represented in the actual life story of a character, plays an important role in the decision-making process. In Figure 1c, the course of a story, each of the events is represented by a point, in which many choices of events lead to the actual life story of a character. In Figure 1d, the character did not or could not take a specific path, and the semantic aspects of story that are represented by the lines. Diagrams 1c and 1d describe specific types of plots as a weave of different destiny lines that traverse a circle indicating a continuous loop. This model provides a

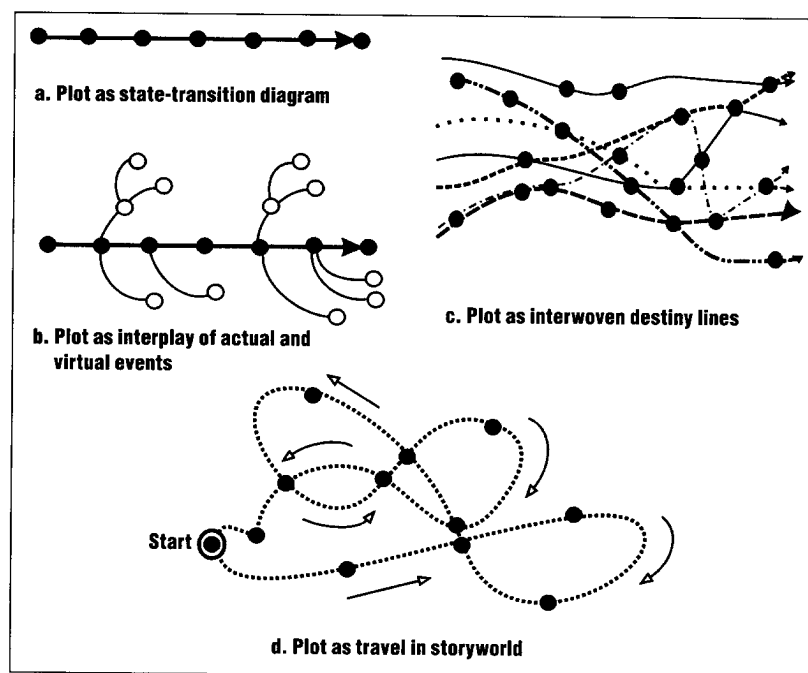


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In all these diagrams, the temporality of plot is symbolized through an oriented line. In Figure 1a, the most basic plot diagram, the horizontal axis stands for a timeline punctuated by the events that change the global state of the storyworld, while the vertical axis could be used for the description of the individual states. Here the plotline is reduced to the collective destiny of the storyworld, and its representation of events is limited to what actually happens. But the virtual, that which could have or still might happen, plays an important role in the decisions of both life and narrative. In the course of a story, each of the characters faces several decisions points, in which many choices offer themselves. Figure 1b contrasts the actual life story of a character with the virtual paths that the character did not or could not take. While Figures 1a and 1b capture semantic aspects of story that are common to all narratives, Figures 1c and 1d describe specific types of plot structures. 1c shows plot as a weave of different destiny lines—one for each character. The lines that traverse a circle indicate which characters participate in this event. This model provides an efficient mapping for narratives

that interleave the lives of a large cast of characters into numerous subplots and concurrent story lines, such as television soap operas. As for Figure 1d, it represents plot as an itinerary through the geography of the storyworld. The two axes of the diagram stand for the east-west and north-south coordinates of a map, the black dots for the various locations within the storyworld, and the oriented line for the journeys of the hero. This type of diagram is particularly useful for narratives of travel, such as the *Odyssey* or James Joyce's *Ulysses*.

In traditional narrative, discourse can be represented by the same type of diagram as 1a, but the order of the events may differ on the story and the discourse level. Assuming that story is sequentially ordered 1-2-3-4-5, etc., a narrative beginning in medias res will, for instance, present events in the order 7-1-2-3-4-5-6-(7)-8-9. Or a narrative may return many times to the same state or event, presenting a sequence as 7-1-2-7-3-4-7-5-6-7-8-9. It would be very artificial for a braided narrative of type 1c to stick to a strictly chronological order, especially since the exact temporal relations between events of different strands (that is, what precedes what and what occurs simultaneously) are usually left indeterminate. The most natural discourse sequence in this case will follow a character for a while and then jump to the life story of another, but multistrand narratives will usually avoid moving back and forth in time along the same strand for fear of confusing the reader with excessive fragmentation.

If, as I argue in chapter 1, "story" is a cognitive structure that transcends media, disciplines, and historical as well as cultural boundaries, the plot diagrams that describe traditional narratives are also valid for interactive narratives, or to be more precise, for the output of each of the individual runs of their underlying program. But if we look at interactive narratives as productive engines, they will also present patterns that are unique to their mode of operation. Figures 2 and 3 show several different types of structural patterns for interactive narrative.⁶ The diagrams in Figure 2 correspond to different ways to navigate through a fixed, predetermined story, while the diagrams in Figure 3 represent patterns of choices that result in different stories.

Figure 2a, the network, is a graph that allows loops and makes at least some of its nodes accessible through different routes. Networks are very efficient models for communication systems, because they

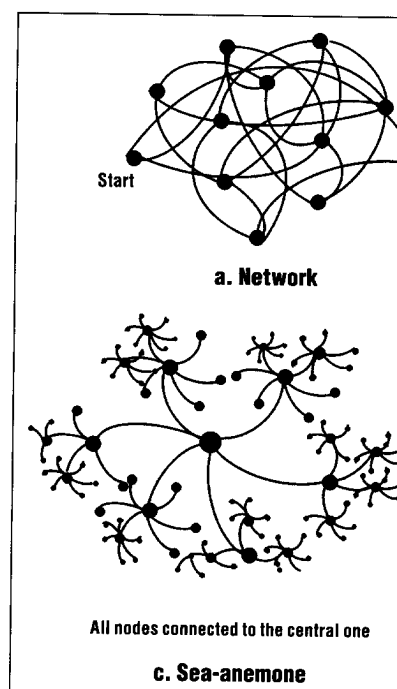


Figure 2. Interactive architectures affected

make it possible to reroute information. The feature that allows rerouting is the feature that allows rerouting in the case of coherent plots. A story is an a time is irreversible. Any diagram of a visited node cannot, consequently, represent a chronological succession of events. A node can occur twice. Moreover, if the nodes are interpreted as temporal succession, the reader to pass through incoherent events. A node that describes a character's state shows her alive; and then again the state works cannot model the temporal progression into inconsistencies (unless they follow a different logic), they can model a course. In this interpretation, the point determines not what will happen, but the order of presentation of the events.

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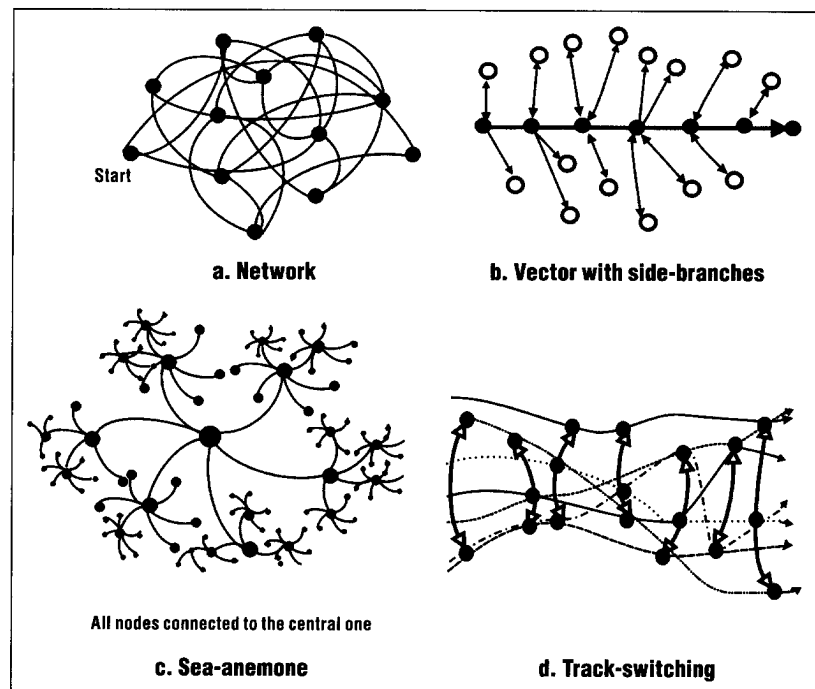


Figure 2. Interactive architectures affecting discourse

make it possible to reroute information when a path is blocked, but the feature that allows rerouting is a major obstacle to the generation of coherent plots. A story is an action that takes place in time, and time is irreversible. Any diagram that allows a return to a previously visited node cannot, consequently, be interpreted as the model of a chronological succession of events, because the same event never occurs twice. Moreover, if the nodes represent events, and if the arcs are interpreted as temporal succession, a network would allow the reader to pass through incoherent sequences: for instance through a node that describes a character's death, then through a node that shows her alive; and then again through the death node. But if networks cannot model the temporality of narrative without running into inconsistencies (unless they represent dreamworlds, which follow a different logic), they can model the temporal unfolding of discourse. In this interpretation, the reader's choices at every decision point determines not what will happen next in the storyworld but the order of presentation of the events.

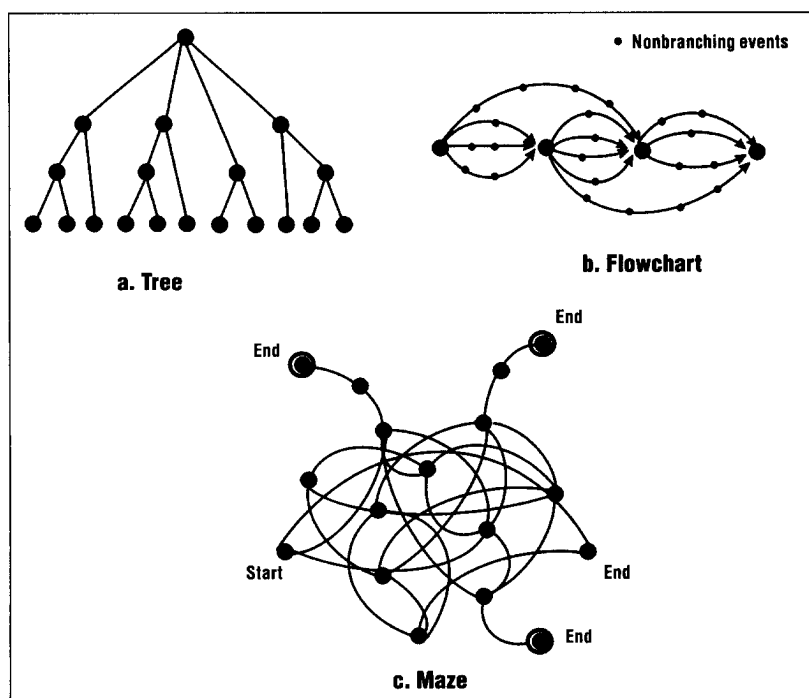


Figure 3. Interactive architectures affecting story

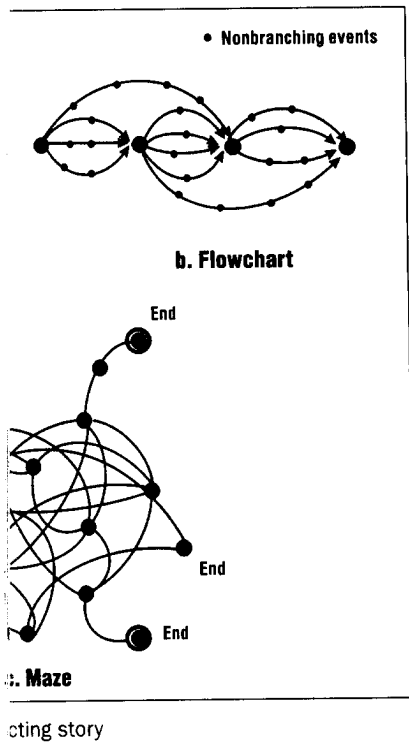
The network is the most common pattern for discourse-level interactivity, but it is not the only one. Figure 2b, the vector with side-branches, takes the reader through the story sequentially, but every episode offers an opportunity to branch toward external materials or optional activities that enrich the story. The radiating structure of 2c, also known as "sea-anemone," allows information to unfold recursively from a main menu into a variety of submenus.⁷ From each point on the diagram, the user can return to the main menu in one jump. Widely used in informational Web sites, the radiating pattern has no special affinities for narrative, but as I will show in chapter 7, it can be put in the service of what Raine Koskimaa calls "archival narratives": stories that the reader reconstructs, not through random travel through a network but by consulting a well-organized database of documents. Figure 2d shows how a braided narrative such as 1c can be made interactive through a track-switching system. Every strand is linked to every other strand at certain decision

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The various patterns are easily combinable: for instance, a radiating pattern could contain on a lower level a vector with side-branches, or the tips of its branches could be structured as networks; a track-switching pattern for braided narrative could combine with a radiating menu reachable in one click, which would give the reader easy access to previous episodes; and the nodes of a network could embed the closed loops of linear stories that return to their point of origin without offering any choice on the way.

For a diagram to represent multiple variants on the level of story, it must be able to capture the flow of time. On the tree-diagram of 3a, branches grow in a steady direction, are kept neatly separate, and do not allow returns to a previous point. These properties allow the vertical axis to represent a temporally organized sequence of events, while the horizontal axis stands for the splitting of the storyworld into parallel worlds with distinct histories. Tree-shaped diagrams are particularly efficient at modeling the decisions that await characters at various moments in their lives. The diagram of virtualities shown in Figure 1b is in fact a tree lying on its side. All it takes to turn the system of possibilities that underlies all stories into an interactive narrative is to let the user make the decisions for the characters at every branching point. The main drawback of the tree as architectural model for interactive narrative is the exponential growth of its branches and the necessity to preplan each branch separately. A tree with many decision points would quickly lead to unmanageable complexity, and the structure is therefore most efficient for stories with long stretches of noninteractive narration.

The flowchart of Figure 3b offers a more efficient management of choice, because the strands of plot are allowed to merge, thereby limiting the proliferation of branches. Here the horizontal axis stands for time, and the vertical axis for different ways to reach a certain point. But the horizontal axis could also receive a spatio-temporal interpretation: the user progresses from site 1 at t_1 to site 2 at t_2 , by performing certain actions. To respect narrative logic, the flowchart should not allow different strands to join when the past actions of characters cast a shadow on their future. For instance, the path of the hero of a Proppian fairy tale who arrives at the dragon's lair with a magic aid obtained from the donor does not merge with the path of his older brother who reaches the same

location without the magic help, because the two brothers do not have equal chances of success in their fight against the dragon. Since plotlines can only come together when the past is erased, a narrative with several endings that depend on the user's past actions would have to branch when the decisive action is taken, even if the strands leading to the various outcomes present similar events beyond the decision point. This kind of diagram is therefore most efficient at representing computer games organized into self-sufficient episodes and discrete levels.

Figure 3c, the maze, can only be viewed as a plot diagram if it represents the topography of the virtual world, as does Figure 1d. The user wanders across this topography, trying to reach certain locations that correspond to the liberation from the labyrinth, while avoiding other endpoints that represent failure. The maze thus traces a spatial narrative with several endings, and every itinerary of the user represents a different adventure in the virtual world. In the network variant, there is no end point to the story. In this type of architecture, each site offers different challenges, and the plot is written by the actions performed at every location, as the user travels from site to site. What neither the maze nor the network diagram can show, however, are the modifications to the system of connections that take place during the user's visit to the virtual world. Some links may be created and others severed, some sites may become reachable and others inaccessible as a result of the user's actions. It would take a series of discrete network diagrams to capture the dynamics of this architecture. The same serialization may in fact be necessary for networks that operate on the discourse level: the link structure of the text may be affected by the user's choices, and it will take several temporally ordered snapshots to capture these changes.

As was the case for discourse patterns, the various types of plot maps can combine into more complex architectures. The patterns of the macrolevel will then embed microlevel patterns of a different type. For instance, the possibilities of action attached to the nodes of the network could be quests that implement the pattern of the flowchart; while to progress along a flowchart, the user may have to solve a maze. This is indeed what happens when the levels of a computer game consist of "new maps." A textual architecture can even combine choices that affect discourse with choices that affect plot. As I have shown elsewhere (Ryan 2001), in the interactive

movie *I Am Your Man*, for instance, points which character to follow, what happens in the storyworld gets to see. At other moments, characters that affect their destinies are

While the diagramming of narrative is an important design tool, it cannot capture the architecture. A plot diagram, in fact, presupposes that every path has a fixed end. The richest storyworlds allow modification in the real time of user-computer interaction. In the system, the designer populates a world with behaviors, and the user creates new behaviors, which affect other agents, and through a feedback loop, on the system's reaction. When the world contains a large number of objects, and when these objects of interaction have different behaviors, the combinatorial possibilities of interaction cannot anticipate all the stories that may emerge. The emergent quality is raised to a high level not only with system-generated interaction but also with human partners capable of creating new behaviors, as is the case in multiple

Types of Interactivity

Interactivity is an umbrella category that covers the relations between a user and a text. I distinguish four strategic forms of interaction: the internal/external and exploratory/creative. These are adapted from Espen Aarseth's four perspectives in cybertexts (1997), which is a broader cybertext typology.⁸ But I place more emphasis toward the user's relation to the text than to the four types described by Aarseth. Interactivity that doesn't combine exploration and creation involves a modification of the code of the text, as is the case during the actual performance of this metatextual activity including the creation of a hypertext, creating new maps and building permanent objects for an

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While the diagramming of narrative possibilities constitutes an important design tool, it cannot describe all types of interactive architecture. A plot diagram, in contrast to a discourse diagram, presupposes that every path has been foreseen by the designer. But the richest storyworlds allow meaningful narrative action to emerge in the real time of user-computer interaction. In this type of system, the designer populates a world with agents capable of diverse behaviors, and the user creates stories by activating these behaviors, which affect other agents, alter the total state of the system, and through a feedback loop, open new possibilities of action and reaction. When the world contains a high number of different objects, and when these objects offer a reasonable variety of behaviors, the combinatorial possibilities are so complex that the designer cannot anticipate all the stories that the system can produce. This emergent quality is raised to a higher power when the user interacts not only with system-generated agents of limited intelligence but with human partners capable of far more imaginative and diverse behaviors, as is the case in multiplayer online virtual worlds.

Types of Interactivity

Interactivity is an umbrella category that covers a wide variety of relations between a user and a text. I propose here to distinguish four strategic forms of interactivity based on two binary pairs: internal/external and exploratory/ontological. These two pairs are adapted from Espen Aarseth's typology of user functions and perspectives in cybertexts (1997, 62–65), which is itself part of a broader cybertext typology.⁸ But I use different labels that shift the emphasis toward the user's relation to the virtual world. In addition to the four types described below, there is also a metatextual interactivity that doesn't combine with any other type, because it involves a modification of the code and cannot therefore be exercised during the actual performance of the text. The manifestations of this metatextual activity include adding new links and nodes to a hypertext, creating new maps and new levels for a game, and building permanent objects for an online virtual world.

Internal versus External Interactivity

In the *internal* mode, users project themselves as members of the virtual world by identifying with an avatar, who can be shown from either a first-person or a third-person perspective.⁹ In the *external* mode, users are situated outside the virtual world. They either play the role of a god who controls the virtual world from above, or they conceptualize their own activity as navigating a database.

Exploratory versus Ontological Interactivity

In the *exploratory* mode, users navigate the display, but this activity does not make fictional history nor does it alter the plot: users have no impact on the destiny of the virtual world. In the *ontological* mode, by contrast, the decisions of the user send the history of the virtual world on different forking paths. These decisions are ontological in the sense that they determine which possible world, and consequently which story, will develop from the situation where the choice presents itself. But since fate-deciding decisions require a knowledge of the world, which is acquired in part through exploration, texts either allow both types of interactivity, in which case they belong to the ontological category, or they limit themselves to the exploratory kind.

The cross-classification of the two binaries leads to four combinations. Each of them is characteristic of different genres, prefers certain types of architecture, and offers different narrative possibilities.

External-Exploratory Interactivity

The external-exploratory mode is predominantly represented by text-based hypertext fictions, though it also includes multimedia works and even purely visual ones, such as the visual hypertext *Juvenate*, discussed in chapter 7. In the texts of this group, the user is external to both the time and space of the virtual world. There are no time limits to the user's actions; these actions do not simulate the behavior of a member of the virtual world; and interactivity is limited to the freedom to choose routes through a textual space that has nothing to do with the physical space of a narrative setting. The implicit map of the text represents a system of connections between fragments (or *lexia*, in George Landow's terminology), not the geography of a virtual world. The cult of nonlinearity and complexity of contemporary aesthetics has made the network

of Figure 2a the preferred architecture. It could implement any of the combinations of 2b as well as the maze of 3c if it leads to a goal.

In classical hypertext, the reader is not connected for the author to control the narrative. Significant stretches. Randomness. Once it escapes the control of the author, the sequence of the *lexia* can no longer be controlled. The sequence, because it is simply random, is a story out of every traversal of a hypertext. The only way to preserve narrative structure is to regard it as a construction. A hypertext and a story. Approaching hypertext as a story should feel free to rearrange its elements. The element encountered at t1 in the reader's time slot t22 in the reader's final traversal. Conceptualize reader involvement. Reader participation affects not the narrative structure in which the global narrative path is determined in the mind. Similarly, with a hypertext, the discovery differ for every player. The narrative structure that is put together. Moreover, the hypertext dominates the image to the construction of the narrative. Interactivity deemphasizes the story. The discovery. This mode is therefore more suited to fiction than for textual worlds that are concerned with the sake of what happens in them. It is at the expense of immersion in the story. This is why so many literary hypertexts are composed of narrative fragments.

Though the links between the fragments are necessarily used to facilitate navigation, the hypertext possible relations between interactivity and the operations required of the reader. The major expansion of narrative structure in hypertext fiction. The list below, the semantic dimensions and textual structure. To the work of Mark Bernstein, Stephanie Strickland, and Scott Brink. Hypertexts will be dominated by

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acts themselves as members of the virtual world, who can be shown from a first-person perspective.⁹ In the *external* type of the virtual world. They either play the virtual world from above, or interact with it as navigating a database.

Interactivity

to navigate the display, but this activity does or does not alter the plot: users have control over the virtual world. In the *ontological* type of the user send the history of the navigation paths. These decisions are ontological in that they determine which possible world, and how it develops from the situation where the user is. Fate-deciding decisions require a high degree of interactivity, in which case the user is free to choose, or they limit themselves to

two binaries leads to four combinations of different genres, prefers certain narrative possibilities.

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is predominantly represented by the *external* type, though it also includes multimedia types, such as the visual hypertext type 7. In the texts of this group, the user is free to choose the time and space of the virtual world. The user's actions; these actions do not alter the virtual world; and interact with it by choosing routes through a textual world. The physical space of a narrative text represents a system of connections, in George Landow's terminology, in the virtual world. The cult of nonlinearity and network aesthetics has made the network

of Figure 2a the preferred architecture of literary hypertext, but it could implement any of the configurations shown in Figure 2, as well as the maze of 3c if it leads to one or more endings.

In classical hypertext, the network is usually too densely connected for the author to control the reader's progression over significant stretches. Randomness sets in after one or two transitions. Once it escapes the control of the author, the order of discovery of the lexia can no longer be regarded as constitutive of narrative sequence, because it is simply not possible to construct a coherent story out of every traversal of a reasonably complex network. The only way to preserve narrative coherence in this type of architecture is to regard it as a construction kit for assembling a world and a story. Approaching hypertext like a jigsaw puzzle, the reader should feel free to rearrange its elements mentally, so that a fragment encountered at t_1 in the reading sequence may be assigned time slot t_2 in the reader's final reconstruction of the plot. If we conceptualize reader involvement as exploratory, the path of navigation affects not the narrative events themselves but only the way in which the global narrative pattern (if there is one at all) emerges in the mind. Similarly, with a jigsaw puzzle the dynamics of the discovery differ for every player, but they do not affect the structure that is put together. Moreover, just as the jigsaw puzzle subordinates the image to the construction process, external/exploratory interactivity deemphasizes the story itself in favor of the game of its discovery. This mode is therefore better suited for self-referential fiction than for textual worlds that hold us under their spell for the sake of what happens in them. It promotes a metafictional stance, at the expense of immersion in the virtual world. This explains why so many literary hypertexts offer a collage of literary theory and narrative fragments.

Though the links between the nodes of hypertext are not necessarily used to facilitate narrative comprehension, the study of the possible relations between interlinked lexia and of the cognitive operations required of the reader to grasp these relations represents the major expansion of narrative (and literary) theory required by hypertext fiction. The list below, which outlines some of the major semantic dimensions and textual functions of links, is indebted to the work of Mark Bernstein, Susana Pajares Tosca, Jeff Parker, Stephanie Strickland, and Scott Rettberg. While informational hypertexts will be dominated by links of type 2, 3, and 5, literary

ones can be expected to offer a more diversified combination of link functions.

1. *Spatial links*. The concept of spatial form was proposed by the literary critic Joseph Frank to describe textual networks of contrasts and analogies between themes, images, and episodes. These networks run against the grain of the temporal development of narrative and reorganize the text into formal patterns that can only be apprehended by contemplating it from a synchronic perspective; hence the label "spatial form." In print texts spatial patterns remain implicit, and they may or may not be noticed, but hyperlinks force them to the reader's attention, challenging her to arrange the connected elements into meaningful structures. Through their propensity to create metaphorical relations, spatial links impart a lyrical quality to the text.

2. *Temporal links*. Recognizing such a function may seem to contradict what I write above about the impossibility of interpreting networks as representations of the flow of time; but if their loops prevent this interpretation on the global level, there is no reason why at least some of the links of a hypertextual network could not suggest that the events described in the connected lexia succeed each other in time. Many hypertexts present default links or single links that move the plot forward. It would indeed be nearly impossible to reconstruct a narrative out of a hypertextual network if it did not offer some fragments of story that come in the proper order. In a jigsaw puzzle, the equivalent of chronologically connected lexia would be groups of pieces that were never broken up. A temporal interpretation of at least some links is unavoidable in hypertexts with multiple endings that implement the architecture of the maze shown in 3c. As soon as the reader reaches a path that leads to an exit, the events along this path will be automatically interpreted as the end of the story, and the links between these events as representations of chronological sequence.

3. *Blatant links*, or "*Choose Your Own Adventures*" links (Jeff Parker's term). The labels of these links give the reader a preview of the content of the target lexia, enabling her to make an informed choice among many plot developments in a structure of type 3a: "If you want Cinderella to leave the ball at midnight, click here; if you want her to stay at the ball, ignoring her Godmother's warning, click there." Mark Bernstein (2000) dismisses blatant links as too legible: they allow readers to skip the links that they don't want

to follow. This would be an advantage but a drawback in literary ones who associate literariness with mystery. But if they give away the *what*, they lose the ability to arouse curiosity on the way.

4. *Simultaneity links*. In narrative 2c, these links allow the reader to explore other, in order to find out what other characters are doing at the same time. For example provided by Jeff Parker (*Wide Smile*), the text highlights "things she does" in the interior of the text, his fiancée. Clicking on the link leads to a scene at this very same time—something that was anticipated.

5. *Digressive and background links*. These functions suspend momentarily the main action of them presuppose the vectorial nature of the text. A variant of this type of link could be used to discard drafts that showcase the dynamics of the writing process.

6. *Perspective-switching links*. These bidirectional links take us into the minds of participants in the same episode. When exploring the contrast between these perspectives, the contrast between these perspectives, the unreliability. In Parker's example, his fiancée as asking one of her friends "do you ever ride ponies?" When the reader reaches the same scene narrated by the lover, she says "poetry?" she said." Obviously the reader has misunderstood the words. Here the perspective that cannot be attributed to the textual perspective of the (implicit) narrator.

Internal-Exploratory Interactivity

The texts of this category transport the reader inside a virtual world, either by providing a way of playing the virtual world from a first-person perspective that reflects the point of view of the user, or by limiting the user to actions that lead

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to follow. This would be an advantage in informational hypertexts, but a drawback in literary ones, at least for those, like Bernstein, who associate literariness with opacity, ambiguity, and difficulty. But if they give away the *what* of the story, blatant links retain the ability to arouse curiosity on the level of the *how*.

4. *Simultaneity links*. In narratives with the braided pattern of 2c, these links allow the reader to jump from one plotline to another, in order to find out what different characters in different locations are doing at the same time. The effect can be ironic. In an example provided by Jeff Parker (from his own hyperfiction *A Long Wide Smile*), the text highlights the words “knowing *what kind of things she does*” in the interior monologue of a man thinking about his fiancée. Clicking on the link will show what the fiancée is doing at this very same time—something that the man could never have anticipated.

5. *Digressive and background-building links*. These opposite functions suspend momentarily the development of the story. Both of them presuppose the vector-with-side branches structure of 2b. A variant of this type of link could provide alternative versions and discarded drafts that showcase the genealogy of the text and the dynamics of the writing process.

6. *Perspective-switching links* (Parker’s “portal links”). These bidirectional links take us into the private worlds of different participants in the same episode. When the characters are also narrators, the contrast between these private worlds may expose their unreliability. In Parker’s example, a first-person narrator reports his fiancée as asking one of her friends (who is also her lover), “*Did you ever ride ponies?*” When the reader clicks on this link, she gets the same scene narrated by the lover: “‘*Did you ever write rhyming poetry?*’ she said.” Obviously one (or both) of the two narrators has misunderstood the words. Here the links themselves express a perspective that cannot be attributed to either narrator—the meta-textual perspective of the (implied?) author.

Internal-Exploratory Interactivity

The texts of this category transport the user into a virtual body inside a virtual world, either by projecting her as a character or by displaying the virtual world from a first-person, horizontal perspective that reflects the point of view of one of its members. But the role of the user is limited to actions that have no bearing on the evolution of

the virtual world, nor on the personal destiny of the avatar: actions such as traveling around the virtual world, looking into its nooks and crannies, picking up objects, examining them, and looking for Easter eggs. To make exploration interesting, the space of the virtual world should be structured as a diversified architecture of either contiguous or embedded subspaces, and to make exploration challenging, the passageways between these subspaces—doors, windows, tunnels, and hidden openings—should be difficult to find. Internal-exploratory participation is particularly well suited to a type of narrative that I will call the “go through a portal and discover another world” story: down the rabbit hole or through the looking glass of Lewis Carroll’s Wonderland, inside the wardrobe that leads to C. S. Lewis’s Narnia, or up the fairy-tale bean stalk with Jack. This exploration cannot present danger, otherwise the destiny of the avatar would be at stake. It proceeds therefore at a leisurely pace, within the time of the virtual world, but not in a race against the clock.

Of the four modes of participation discussed in this chapter, internal-exploratory is the least common, at least in a pure form, because it imposes severe restrictions on the agency of the interactor. The internal-exploratory mode is best represented in early digital texts with limited technological resources, such as *The Manhole* (1988), an interactive environment designed by Robyn and Randy Miller, who later became famous as the authors of the *Myst* series of computer games. Structured as a series of still pictures activated by clicking on invisible hot spots, *The Manhole* invites the user to explore a fantastic world populated by strange creatures and full of secret passages that lead into new worlds. In contrast to standard computer games, *The Manhole* has no puzzles, no goals, no obstacles, and no endings: the user travels freely across its space, and the reward lies entirely in the journey. The network architecture of *The Manhole* prevents it from developing a sustained plot, but its individual screens are teeming with potential stories that kindle the imagination: a pink elephant rowing down a canal, or a walrus guarding a library full of books on subjects ranging from fantasy to deconstruction. Exemplifying the indeterminate mode of narrativity, *The Manhole* provides the illustrations, and challenges the user to create the stories.

Through its emphasis on travel, internal-exploratory participation lends itself particularly well to narratives that invest in the imaginative appeal of their spatial setting. This could be an electronic version of *Alice in Wonderland*, where Alice, the player’s

character, would explore Wonderland, its inhabitants, overhear conversations, and witness the unfolding of the story of Wonderland. This is all narratives that foreground the exploratory category. If Alice attempts to fulfill a mission of some kind, as is the case in the computer game, the user’s participation will be internal-exploratory.

Another type of digital text is the detective mode is what Henry Jenkins calls “the detective mode” (126). This structure, which covers a wide range of reconstitute events that took place in the past, follows multiple threads. In a detective story, the threads are the story of the investigation. The story of the murder follows a fixed internal sequence, and the investigation is “written” by the actions of the user. The user follows facts in a wide variety of different directions in the virtual world in search of clues.

The Aristotelian plot of interactivity and resolution does not lend itself to this mode, because its strength lies in a precise sequence of events that prevents most forms of user interaction. The implementation resides therefore in the role of a semipassive user in the role of a semipassive user. In this type of production, the user would be following the action from various points of view, interacting with the characters (who would be computer-simulated actors), and using a limited set of words with them, but she would not be able to (1986, 85) calls a “non-voting” mode. In this interactive narrative is ever going to be a part of movies and drama, it will be a part of the design of a largely fixed narrative.

External-Ontological Interactivity

In this type of text, the user plays the strings of the entities that populate the world, selecting these entities, but not interacting with them.

sonal destiny of the avatar: actions in the virtual world, looking into its nooks and corners, examining them, and looking for something interesting, the space of the virtual world is a diversified architecture of either concrete or abstract spaces and to make exploration challenging. These subspaces—doors, windows, corridors—should be difficult to find. Internal spaces are particularly well suited to a type of narrative that is explored through a portal and discover another world or through the looking glass of a mirror to find the wardrobe that leads to C. S. Lewis's *Narnia* tale bean stalk with Jack. This exploration is otherwise the destiny of the avatar, which is therefore at a leisurely pace, within a virtual world not in a race against the clock.

Participation discussed in this chapter, which is common, at least in a pure form, belongs to the agency of the interactor. It is best represented in early digital texts such as *The Manhole* (1988), analyzed by Robyn and Randy Miller, who are authors of the *Myst* series of computer games. *The Manhole* still pictures activated by clicking on them invites the user to explore a fantasy world full of secret passages and full of secret passages. In contrast to standard computer games, *The Manhole* has no goals, no obstacles, and no endings: the user explores the space, and the reward lies entirely in the exploration. The architecture of *The Manhole* prevents it from being a game, but its individual screens are teeming with the imagination: a pink elephant, a library full of books, and a deconstruction. Exemplifying the virtual world, *The Manhole* provides the illusion of creating the stories.

At the level, internal-exploratory participation is well suited to narratives that invest in the virtual setting. This could be an electronic *Wonderland*, where Alice, the player's

character, would explore *Wonderland*, stumble into the lives of its inhabitants, overhear conversations, gather gossips, and watch the unfolding of the story of *Wonderland* like a live spectacle. But not all narratives that foreground the experience of space fall into the exploratory category. If Alice travels across *Wonderland* in the attempt to fulfill a mission of some significance for the virtual world, as is the case in the computer game *American McGee's Alice*, the user's participation will be internal and ontological.

Another type of digital text that relies on the internal-exploratory mode is what Henry Jenkins calls the embedded narrative (2004, 126). This structure, which covers any attempt by the interactor to reconstitute events that took place in the past, connects two narrative threads. In a detective story, the prime example of the genre, these threads are the story of the murder and the story of its investigation. The story of the murder is determined by the author and follows a fixed internal sequence, while the story of the investigation is "written" by the actions of the user, who may discover the facts in a wide variety of different orders, as he wanders across the virtual world in search of clues.

The Aristotelian plot of interpersonal conflict leading to a climax and resolution does not lend itself easily to active participation because its strength lies in a precise control of emotional response that prevents most forms of user initiative. Its best chance of interactive implementation resides therefore in a VR simulation that places the user in the role of a semipassive witness or minor character. In this type of production, the user would exercise her agency by observing the action from various points of view, by mingling corporeally with the characters (who would be played by synthespians, that is, computer-simulated actors), and perhaps by exchanging an occasional word with them, but she would remain what Thomas Pavel (1986, 85) calls a "non-voting member" of the virtual world. If interactive narrative is ever going to approach the emotional power of movies and drama, it will be as a three-dimensional world that opens itself to the body of the spectator but retains the top-down design of a largely fixed narrative script.

External-Ontological Interactivity

In this type of text, the user plays god to a virtual world. Holding the strings of the entities that populate this world, and sometimes selecting these entities, but not identifying with any of them, she

specifies their properties, makes decisions for them, throws obstacles in their way, alters the environment, launches transforming processes, and creates events that affect the global evolution of the virtual world.

The prime example of external-ontological interactivity is the simulation game, whose representatives include *Simcity*, *Simlife*, *Caesar*, and *The Sims* (CD-ROM, single-player version).¹⁰ In these games, which exemplify the type of structure described above as emergent, players rule over a complex system, such as a city, an ant colony, an empire, or a family. The range of possible developments at any given moment depends on the possibilities of action offered by the various objects and individuals within the virtual world. For instance, a computer in *The Sims* affords two types of action: play games or look for a job. The choice of one of these affordances affects the life and the options of several members of the virtual world. In one possible scenario, the user may decide that Betty in *The Sims* will use the computer to get a job. When Betty earns money, she will be able to buy a wider variety of commodities, and this may affect Bob's feelings for Betty. The possibilities of action evolve during the run of the program, and since affordances are determined by the global state of the system, as well as by the nature of the objects, the user's choices will always produce a coherent narrative development.

Simulation games do not follow a scripted narrative path, but they do present a global design that gives a general purpose to the actions of the user. This built-in design is a broad evolutionary theme that allows a wide variety of particular instantiations: themes such as suburban life and the pursuit of happiness (*The Sims*), human development (*Babyz*), the management of a city (*Simcity*), or the building of civilizations (*Civilization*). But the user can sometimes subvert the built-in theme: *Sims* players have been known to create all sorts of catastrophes for their characters rather than supporting a crassly consumerist philosophy that makes happiness dependent on the accumulation of commodities. (I believe, however, that the game pokes fun at this philosophy rather than uncritically promoting it, for instance, by offering ludicrous objects for sale.)

Since evolution is a never-ending process, the narratives of this group never come to a resolution, unless this resolution is the total destruction of the system by a catastrophic event that the user cannot prevent. In *Simcity*, for instance, an earthquake could destroy

the town, and in *The Sims*, a fire or a catastrophic event, which are the limits of the power of the user in the virtual world, but far from being omnipotent. In contrast to the laws of the virtual world, laws are not spelled out to the user but are discovered during play by interaction.

Because they are evolving, external-ontological interactivity exist in a limited time span. In *The Sims*, the player manages and rules the life of the characters. Characters go to the bathroom at regular intervals in the virtual world and the clock of the real world. For instance, it may take ten minutes in the virtual world to manage twenty-four hours in the real world. The difference between these two times produces a distinction between "time of the game" and "time of the real world." The temporality of the game has only a limited time span to act. If a character gets a job, the player must take her to work at eight o'clock to allow her to catch the bus to work. If she misses the bus she must wait until the clock to perform actions that are available in the menu of possible options, such as cleaning the house. Whereas internal-ontological interactivity takes place in a time frame that I have called "suspended time," external-ontological interactivity has a choice between a limited time span and suspended time.

The external position of the user in the virtual world is suggested by a visual design that is above and at an angle, in a perspective that is known as panoramic. In *The Sims*, the user's view is a compromise between a plan view and a perspective. The panoramic map allows the user to see the whole world from a perspective. The panoramic map allows the user to see the whole world from a perspective, but its vertical projection prevents the user from seeing the world thereby offering an omniscient perspective that can only belong to a disembodied observer. In the virtual world, the user encounters no obstacles in the horizontally experienced space.

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the town, and in *The Sims*, a fire could kill the whole family. These
 catastrophic events, which are thrown in by the system, demonstrate
 the limits of the power of the user. She may play god to the virtual
 world, but far from being omnipotent, this god must accept the laws
 of the virtual world. In contrast to the rules of board games, these
 laws are not spelled out to the player before the game begins but
 discovered during play by interacting with the gameworld.

Because they are evolving entities, the worlds of external-
 ontological interactivity exist in time, and the user must learn to
 act in a limited time span. In *The Sims*, a clock is continually run-
 ning and rules the life of the characters. They must eat, sleep, and
 go to the bathroom at regular intervals. The clock of the virtual
 world and the clock of the real world do not run at the same pace;
 for instance, it may take ten minutes of the player's real-world time
 to manage twenty-four hours in the life of the Sims. The differ-
 ence between these two times parallels the standard narratological
 distinction between "time of the narrated" and "time of the nar-
 ration." The temporality of the virtual world means that the user
 has only a limited time span to perform certain actions. If Betty
 gets a job, the player must take her to the curb in front of her house
 at eight o'clock to allow her to catch the bus that will take her to
 work. If she misses the bus she may be fired. But the user can stop
 the clock to perform actions that necessitate the consultation of a
 menu of possible options, such as such as buying goods and deco-
 rating the house. Whereas internal-exploratory interactivity takes
 place in a time frame that I have described as leisurely, the external
 interactor has a choice between an inexorably running time and a
 suspended time.

The external position of the user with respect to the virtual
 world is suggested by a visual display that shows this world from
 above and at an angle, in a perspective typical of a type of map
 known as panoramic. In *The Sims*, for instance, the display is a
 compromise between a plan view of a house taken from a verti-
 cal perspective and an elevation view taken from a horizontal per-
 spective. The panoramic map allows items to be easily recognized,
 but its vertical projection prevents objects from hiding each other,
 thereby offering an omniscient apprehension of the virtual world
 that can only belong to a disembodied eye. Floating high above the
 world, the user encounters no obstacles to navigation. In contrast to
 the horizontally experienced space of internal participation, which

is structured as a collection of subspaces of problematic accessibility, the obliquely projected world of external participation can be easily explored by scrolling the display. The space of simulation games is not a series of problems to be solved, as it is in narratives with internal participation, but a container for objects capable of diverse behaviors, and its design is supposed to facilitate the manipulation of these objects.

Internal-Ontological Interactivity

Here the user is cast as a character situated in both the time and space of the virtual world. His actions determine the fate of the avatar, and by extension, the fate of the virtual world. Every run of the system produces a new life, and consequently a new life story for the avatar. This narrative is created dramatically, by being enacted, rather than diegetically, by being narrated.

If the mythical Holodeck of the TV series *Star Trek* could be put into operation, it would be the fullest possible implementation of internal-ontological interactivity. The Holodeck is a kind of VR cave, to which the crewmembers of the starship *Voyager* retreat for relaxation and entertainment. In this cave, a computer runs a three-dimensional simulation of a fictional world, and the interactor becomes in make-believe a character in a digital novel. The plot of this novel is generated live, through the interaction between the human participant and the computer-created virtual characters. As Janet Murray writes: "The result is an illusory world that can be stopped, started, or turned off at will but that looks and behaves like the actual world. . . . The *Star Trek* Holodeck is a universal fantasy machine . . . a vision of the computer as a kind of story-telling genie in the lamp." It enables crewmembers to "enter richly detailed worlds . . . in order to participate in stories that change around them in response to their actions" (1997, 15).

As we wait for AI and VR technology to become sufficiently sophisticated to implement the Holodeck, we will have to satisfy our desire for internal-ontological participation in virtual worlds with screen-based projects that use the keyboard rather than the whole body as interface. At the present time, the closest to the Holodeck is *Façade*, an AI-based project in interactive drama by Michael Mateas and Andrew Stern that truly makes narrative action the center of interest because the user's participation is not motivated by winning a game. This project will be discussed in chapter 7. But

by far the most common form of internal-ontological participation is represented by computer games. The player is a individuated character who must face a series of challenges and dangers of danger. The best examples of action games are first-person shooters (*Doom*, *Quake*, *Half-Life*), which are directly inspired by J. R. R. Tolkien's *The Lord of the Rings*, *EverQuest*, and *Ultima Online*.

The player of a game is usually motivated by the pursuit of a goal to reflect on the plot, but when players describe their experience of a computer game, their reports tend to focus on the plot. (See chapter 8 for Espen Aarsef's analysis of *Morrowind*.) It may be objected that the point of adventure/action games is not to be played for the sake of solving problems, but for the sake of refining strategic skills, and of exploring possibilities, and not for the purpose of telling a story. The drama of most games is not the player's active participant; it is meant to be a background. If narrative were totally irrelevant, why would designers put so much effort into creating an interface? Why would the task of the player be saving terrorists or saving the earth from outer space, rather than as a means of saving targets with a cursor control device? The variety of action games functions as a means of what would call a "prop in a game of chance." The *raison d'être* of most games, especially action games, is on the physical skill of eye-hand coordination. The important role as a stimulant for action games is to use lengthy film clips, during which the player can enrich the plot. Yet the fact that the player can move control from the user to the computer is a further indication that interactive games are not the construction of narrative means.

Generally modeled after the *Dungeons and Dragons*, worlds of action games complement the archetypal pattern of the hero's journey of Campbell and Vladimir Propp. In a mission, passes many tests in

spaces of problematic accessibility of external participation can be displayed. The space of simulation to be solved, as it is in narratives, is a container for objects capable of being supposed to facilitate the ma-

ter situated in both the time and actions determine the fate of the virtual world. Every run of the virtual world and consequently a new life story created dramatically, by being entered and being narrated.

In the TV series *Star Trek* could be the fullest possible implementation of this. The Holodeck is a kind of VR of the starship *Voyager* retreat for this cave, a computer runs a three-dimensional world, and the interactor better in a digital novel. The plot of the interaction between the computer-created virtual characters. As it is an illusory world that can be entered at will but that looks and behaves like *Star Trek* Holodeck is a universal of the computer as a kind of story-boards crewmembers to "enter richly and participate in stories that change their actions" (1997, 15).

Technology to become sufficiently sophisticated, we will have to satisfy our participation in virtual worlds with the keyboard rather than the whole of time, the closest to the Holodeck in interactive drama by Michael Chabon truly makes narrative action the user's participation is not motivated and will be discussed in chapter 7. But

by far the most common form of internal-ontological interactivity is represented by computer games that project the player as an individuated character who must accomplish missions in a world full of danger. The best examples of this type of game are first-person shooters (*Doom*, *Quake*, *Half-Life*), and medieval fantasy games inspired by J. R. R. Tolkien's *Lord of the Rings* (*Morrowind*, *EverQuest*, and *Ultima Online*).

The player of a game is usually too deeply absorbed in the pursuit of a goal to reflect on the plot that he writes through his actions, but when players describe their sessions with this type of computer game, their reports typically take the form of a story. (See chapter 8 for Espen Aarseth's narrative of his adventure in *Morrowind*.) It may be objected that creating a narrative is not the point of adventure/action games. Computer games are mainly played for the sake of solving problems and defeating opponents, of refining strategic skills, and of participating in online communities, and not for the purpose of creating a trace that reads as a story. The drama of most games is only worth experiencing as an active participant; it is meant to be lived and not spectated. Yet if narrativity were totally irrelevant to the enjoyment of games, why would designers put so much effort into the creation of a narrative interface? Why would the task of the player be presented as fighting terrorists or saving the earth from invasion by evil creatures from outer space, rather than as "gathering points by hitting moving targets with a cursor controlled by a mouse"? The narrativity of action games functions as what Kendall Walton (1990, 21) would call a "prop in a game of make-believe." It may not be the *raison d'être* of most games, especially not of those games that rely on the physical skill of eye-hand coordination, but it plays such an important role as a stimulant for the imagination that many games use lengthy film clips, during which the player can only watch, to enrich the plot. Yet the fact that it is necessary to temporarily remove control from the user to establish the narrative frame is a further indication that interactivity is not a feature that facilitates the construction of narrative meaning.

Generally modeled after the nondigital role-playing games *Dungeons and Dragons*, worlds of this type almost invariably implement the archetypal pattern of the quest, as described by Joseph Campbell and Vladimir Propp. In a quest narrative, a hero is given a mission, passes many tests in order to fulfill this mission, and

defeats a villain, thereby ensuring the triumph of good over evil. The main deviances from the archetype are the possibility for the hero to lose, the virtually never-ending character of the adventure, and an occasional dissociation of the hero-villain dichotomy with the forces of good and evil: the avatar of the player can be a bad guy, such as a hired killer or a car thief. As was the case with Propp's corpus of Russian fairy tales, individual games mainly differ from each other through the concrete motifs that flesh out the conventional structure. When quest games speak to the imagination, it is usually through motifs that express elemental fears and desires, as do fairy tales and other texts of popular culture.¹¹ Their lack of variety on the level of plot structure can be explained by the inherent difficulty to create truly interactive narratives, but, as Andrew Darley has observed, it also owes to the fascination of designers and customers with the spectacle of technology. As long as new games can offer better graphics, faster action, and more realistic representation of movement ("game physics"), why should developers bother to develop new narrative formulae? The game *Doom III*, released in 2004, is visually and kinetically far superior to its predecessors *Doom I* and *II*, and it induces a far stronger sense of horror (even some hard-skinned players find its dark corridors, repulsive monsters, and gory display of blood downright frightening), but the plot is basically the same. We may have to wait for the improvement of graphic representation to hit a ceiling to see game designers devote more attention to narrative.

No matter how the narrative pattern is thematically concretized, its progression depends chiefly on two types of action: moving around the virtual world and shooting. This feature may be attributed to a cultural fascination with violence, especially among teenage males, and to the reluctance of developers to move away from established audiences, but it also reflects the properties of the medium. Computer games offer two ways of performing actions: selecting them from a menu, which requires a stopping of the clock and a temporary de-immersion from the virtual world, and performing them within the gameworld by manipulating control devices, a much more immersive mode of operation, because it doesn't break the flow of the action. The first type dominates games with external interactivity, while the second type is the preferred mode in internal participation. Of all types of actions, none are better simulated by manipulating a control device than mov-

ing and shooting: the movement of the avatar, the clicking of a mouse or the pulling of a trigger. For a constant engagement with the virtual world, action must be frequent, and for immersion, actions must have an immediacy that is greater than clicking and seeing nothing. When the player pulls a direction, he sees his avatar move, and he feels the sensation of a high degree of control. This is the greater feeling of power because of the direct result of pulling the trigger: shooting. It is not my intention to "fragged" bodies. It is not my intention to play computer games; but the theme of the game is the efficiency the reactive nature of the game.

Ontological-internal interactivity is the reality of the two preceding categories. It is exploring the world, suspending time, selection from a menu, and "real-time" action when the player fights enemies. The narrative themes operate in an abstract space, move the time of the virtual world, and move the player, since they deprive him of time. The difference between time and space is time—what Jesper Juul (2004, 1) calls a much smaller in games of internal participation, approaching a 1:1 scale. It takes a mouse and to pull a trigger, which is a plant in a simulation game, as Juul (2004) process into an instantaneous event. The sense of their size by making the player feel reflect the speed of travel in real time. It takes months for an avatar to cross a vast space, other. On the basis of this speed, the player can "physical" measurement in the game, they only exist as code whose i is a small amount of real-world space.

To give the user the sense of being in the space of this group represent space from the game, allow the player to plot his strategy, and to switch between map view and

ing the triumph of good over evil. The archetype are the possibility for the ever-ending character of the adventuring of the hero-villain dichotomy: the avatar of the player can be a car thief. As was the case with role-playing games, individual games mainly diffuse concrete motifs that flesh out the quest games speak to the imaginations that express elemental fears and desires of popular culture.¹¹ Their plot structure can be explained by the truly interactive narratives, but, as also owes to the fascination of the spectacle of technology. As long as graphics, faster action, and more movement ("game physics"), why should new narrative formulae? The game is visually and kinetically far superior to *II*, and it induces a far stronger visceral response. Skinned players find its dark, gory display of blood downright aesthetically the same. We may have to sacrifice graphic representation to hit a ceiling of attention to narrative. The game pattern is thematically concretized chiefly on two types of action: movement and shooting. This feature may be associated with violence, especially among the reluctance of developers to move away from it also reflects the properties of the game. It offers two ways of performing action: a menu, which requires a stopping of immersion from the virtual world, and the gameworld by manipulating a conversive mode of operation, because of the action. The first type dominates the game, while the second type is the preparation. Of all types of actions, none is more fundamental than mov-

ing and shooting: the movements of a cursor on a screen imitate travel, and clicking a mouse or pushing a button on a joystick imitates the pulling of a trigger. For an action game to simulate life as a constant engagement with the world, the opportunities for action must be frequent, and for the game to be worth playing, the actions must have an immediate effect: nothing is more irritating than clicking and seeing nothing happen. When the player chooses a direction, he sees his avatar move immediately, and this provides the sensation of a high degree of control. Shooting gives an even greater feeling of power because of the instantaneous and dramatic result of pulling the trigger: shattered objects, gushing blood, and "fragged" bodies. It is not my intent to defend the violence of computer games; but the theme of shooting exploits with a frightful efficiency the reactive nature of the medium.¹²

Ontological-internal interactivity combines the types of temporality of the two preceding categories: leisurely time when the user is exploring the world, suspended time for actions that require a selection from a menu, and "real time," or "running clock time" when the player fights enemies. The cut scenes that reinforce the narrative themes operate in an ambiguous temporality: while they move the time of the virtual world forward, they suspend time for the player, since they deprive him of the opportunity to take action. The difference between time of the playing and represented time—what Jesper Juul (2004, 134) calls "mapping"—tends to be much smaller in games of internal participation than in god games, approaching a 1:1 scale. It takes about the same time to click on a mouse and to pull a trigger, while the construction of a power plant in a simulation game, as Juul observes, condenses a lengthy process into an instantaneous event. Online virtual worlds give a sense of their size by making the rate of progress across their space reflect the speed of travel in real geography: it may take several months for an avatar to cross a virtual world from one end to the other. On the basis of this speed, virtual worlds can be given precise "physical" measurement in terms of kilometers, even though they only exist as code whose inscription takes an infinitesimal amount of real-world space.

To give the user the sense of being inside the virtual world, games of this group represent space from a horizontal perspective, but to allow the player to plot his strategy, they may offer the possibility to switch between map view and horizontal view. In a world where

Narratology is essentially a taxonomical project, but most taxonomies have to deal with phenomena that do not fit neatly into clear-cut categories, and this one is no exception. Arranging the four types of interactivity on a wheel-shaped diagram (Figure 4) presents them as points on a continuum and makes room for hybrid forms that mediate between the pure types.

simulation games
with individuated
"god" figure

Internal-Ontological:
adventure shoot-
multiplayer on

External-Exp
classic hyper

story-trees:
multiple-choice
adventure texts

External-Ontological:
simulation games

N
NW
W
SW
S
E

base. When the user identifies what happens in a *Choose Your Own Adventure*, it will belong to the northeast corner.

We have seen above that the main exploratory category are texts that investigate past events. As long as

ing, geography must be interesting, be organized into subspaces, as it is up. But in contrast to purely explor- e will be full of dangers for the ava- re of shooter games is the labyrinth, ers allow enemies to hide. Many vir- a symbolic structure reminiscent of aic societies, as described by Mircea spaces of religious cosmology become ngerous zones that may include heal- mes where players are protected from l for trade and areas designated for es of power at the center of the uni- e book to describe the symbolic geog- uest. Each region of its virtual world, its dangers, benefits, legends, history, s that roam in the area.

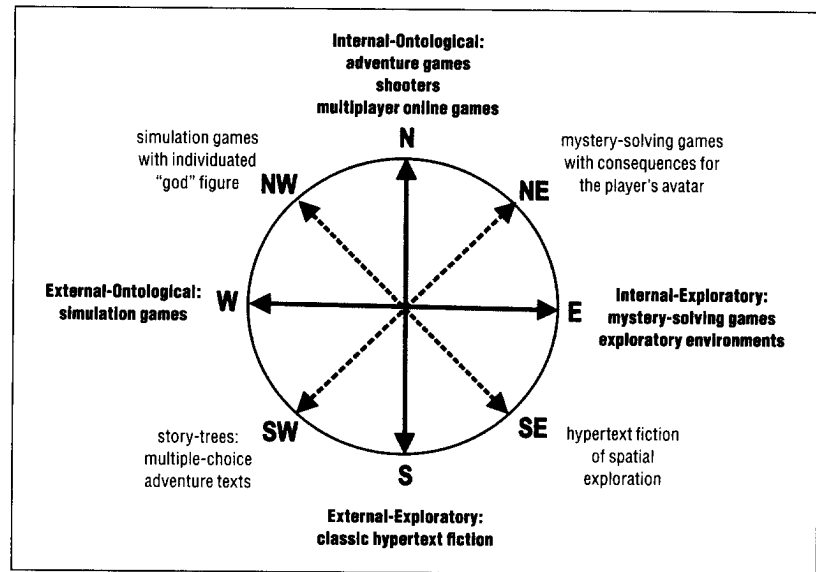


Figure 4. Types of interactivity

onomical project, but most taxono- mena that do not fit neatly into clear- s no exception. Arranging the four l-shaped diagram (Figure 4) presents n and makes room for hybrid forms types.

st corner, the user is clearly external impact of her actions is debatable. that asks the user to decide whether t like a hero or like a coward. Does exploration of a predefined narrative y an author, or does the user decide here and now, by selecting one op- e answer depends on whether or not ner or not the user has several shots not be replayed (a purely theoretical ver implemented), and if it presents ser will see herself as playing god to choices are random, and the text can allowing the textualization of all the tualize her role as exploring a data-

base. When the user identifies with the main character, as could happen in a *Choose Your Own Adventures* story, tree-shaped texts will belong to the northeast corner.

The northwest pole is represented by simulations that individuate the god figure of the external-ontological category and tie his fate to his performance as manager of the virtual world. In the game *Caesar*, for instance, the user is the ruler of the Roman Empire; in *Simcity*, the mayor of the city; and in *Babyz*, she has to raise a child. The mayor will be voted out of office if his administration of the city does not please his constituents, Caesar will be dethroned if the barbarians invade his empire, and the baby will never learn to walk and talk if she is neglected by her mother. But these avatars are not truly internal to the virtual world, because they do not exist on the same plane as its regular members, and they do not interact with them on a truly personal basis. (*Babyz* may be an exception: users develop emotional relations to their babies, to the point of proudly posting their picture on the Web.)

We have seen above that the main representatives of the internal-exploratory category are texts that cast the user into the role of an investigator of past events. As long as the story of the investigation and

the investigated story remain strictly separate, the role of the user is clearly exploratory, but when the result of the investigation has a lasting effect in the virtual world, the two narrative threads will merge into an ontologically meaningful development. This hybrid situation occupies the northeast corner of the diagram. In the game *Myst*, for instance, the user discovers events that took place in the past, but the story lines formed by these events extend into the present, and the user's actions determine both his own fate and the fate of the characters: in one ending, he frees the good wizard Atrus and imprisons his villainous sons in a book; in the other ending, he himself ends up as prisoner of the brothers. Another type of interactivity that occupies the northeast corner of the diagram is what I call fake ontological participation. Because interactivity depends on the execution of code, and because code is invisible, users can never be completely sure that the system truly listens to their input. In the Web-based narrative On-line Caroline, as Jill Walker has discovered (2004), the program creates a character who exchanges e-mail with the user, and the user is under the impression that his personal relation with Caroline will affect her behavior, but no matter what the user tells Caroline, her life story remains exactly the same.

At the southeast pole, finally, are texts that lend themselves to different acts of imagination. Depending on the propensity of the reader for immersion, she may see herself as located inside or outside the virtual world. Take, for instance, the case of Deena Larsen's *Marble Springs*, a hypertext that invites the reader to explore a Colorado ghost town. The reader navigates the textual network by navigating the map of the town or of the cemetery. If she clicks on a house on the city map, she gets a poem that relates to its female inhabitants; if she clicks on a gravestone on the cemetery map, she gets the inscription. Some readers will see themselves as the external operator of a textual machine, as they do in standard hypertexts, while others will identify with a traveler to Marble Springs. These readers will interpret the cursor on the screen as the representation of their virtual body in the virtual world.

Some Myths about Digital Narrative

If we compare the field of digital textuality to other domains in the humanities, its most striking feature is the precedence of theory over the object of study. Most of us read novels and see movies

before we consult literary criticism. It seems safe to assume that a vast number of people read *Hypertext 2.0* before they read a novel. To take another example, we read about virtual reality technology would mean that we would have seen VR before VR became reality (if it ever does). We have put into circulation a number of myths. Switching from the descriptive to the prescriptive stance of poetics, I will now issue a warning against the uncritical acceptance of these myths.

1. *Digital narrative is about choice. The more choice we give to the user, the more pleasurable the experience will be. A valuable, the textual experience is a lesson from another field. It teaches us that choice is good and meaningful. Choice has recently come under fire. As a result, a review of *The Paradox of Choice* by Barry Schwartz, "at some point there is a limit to what to buy or what career to choose. What to invest in that many people make choices about if they had fewer choices—or so the theory goes." In the domain of interactive narrative, choice is more likely to lead to confusion with the missed opportunities than to coherent sequences of events, than to empowerment. The best practice is to place limits on the agency of the user. Periods of user activity and periods of inactivity. Narrowing down the choices in the narrative is the successful assimilation of the narrative. Games that allows players to respond to the situations.*

2. *Narrative can be produced by the combination of elements, and by permuting these elements. It is possible to create a nearly infinite number of narratives. I call this idea the myth of the infinite narrative. Luis Borges, in which the scrutiny of the narrative is the experienter to contemplate the narrative down to its most minute details. The narrative that expands into an infinity of*

strictly separate, the role of the user as the result of the investigation has changed. In the virtual world, the two narrative threads will continue their meaningful development. This hybrid is the last corner of the diagram. In the center, the user discovers events that took place in the virtual world, formed by these events extend into the real world, as they determine both his own fate and the fate of the other. In the ending, he frees the good wizard from his sons in a book; in the other ending, he frees the bad wizard from the power of the brothers. Another type of interaction is located in the northeast corner of the diagram is participation. Because interactivity depends on the user's choice, and because code is invisible, users believe that the system truly listens to their choices. In the interactive On-line Caroline, as Jill Walker Truitt's program creates a character who extends the user is under the impression that Caroline will affect her behavior, but in the end, Caroline, her life story remains

flexible, are texts that lend themselves to multiple interpretations. Depending on the propensity of the user, she may see herself as located inside or outside the virtual world. For instance, the case of Deena and the virtual text that invites the reader to explore the virtual world. The reader navigates the textual network of the town or of the cemetery. If she explores the town, she gets a poem that relates to the virtual world. If she explores the cemetery, she gets a poem that relates to the virtual world. Some readers will see themselves as users of a virtual machine, as they do in standard interactive fiction. Others will identify with a traveler to Marblehead and interpret the cursor on the screen as the virtual body in the virtual world.

Narrative

The transfer of textuality to other domains in the virtual world. A key feature is the precedence of theory over practice. Just as we read novels and see movies

before we consult literary criticism and cinema studies, but it seems safe to assume that a vast majority read George Landow's *Hypertext 2.0* before they read any work of hypertext fiction. Or, to take another example, we read full descriptions of what virtual reality technology would mean for our lives and for art long before VR became reality (if it ever did!). This advance theorizing has put into circulation a number of myths about digital narrative. Switching from the descriptive stance of narratology to the prescriptive stance of poetics, I will conclude this chapter by issuing a warning against the uncritical acceptance of three of these myths.

1. *Digital narrative is about choice, and the more choice you give to the user, the more pleasurable, or the more aesthetically valuable, the textual experience.* Here digital narrative could learn a lesson from another field. It used to be an axiom among economists that choice is good and more choice is better, but this theory has recently come under fire. As Steven Perlstein (2004) writes in a review of *The Paradox of Choice: Why More Is Less* by Barry Schwartz, "at some point there gets to be so many options about what to buy or what career to go into or which mutual fund to invest in that many people make worse decisions than they would if they had fewer choices—or simply put off making a decision at all." In the domain of interactive narrative, an overabundance of choices is more likely to lead to confusion, frustration, and obsession with the missed opportunities, as well as to logically inconsistent sequences of events, than to give the user a sense of freedom and empowerment. The best protection against these dangers is to place limits on the agency of the user, either by orchestrating periods of user activity and periods of system control or by narrowing down the choices in the case of constant interactivity. It is the successful assimilation of this lesson by designers of shooter games that allows players to respond quickly and efficiently to new situations.

2. *Narrative can be produced through a random combination of elements, and by permuting a finite set of textual fragments, it is possible to create a nearly infinite number of different stories.* I call this idea the myth of the Aleph, after a short story by Jorge Luis Borges, in which the scrutiny of a cabalistic symbol enables the experiencer to contemplate the whole of history and of reality, down to its most minute details. The Aleph is a small, bound object that expands into an infinity of spectacles. The experiencer could

therefore devote a lifetime to its contemplation. The kaleidoscopic effect of recombinant objects works very well with visual elements, because pictures do not need to represent anything, and to a certain extent with poetic language,¹³ because the predominantly symbolic and metaphorical meaning of poetry leaves much more interpretive freedom to the reader than texts whose meaning depends on chronological or logical sequence. Narrative not only relies on sequence; it also builds a literal, rather than symbolic, model of human experience. As an attempt to make sense out of life and to overcome the randomness of fate through purposeful action, this model simply cannot be generated through aleatory processes. The computer may throw in random events in a simulation game, but the response of the system to these events must be rational, if the run of the program is to be interpreted as a story.

3. *Becoming a character in a story is the ultimate narrative experience.* This idea is suggested by the Holodeck, whose simulation of Victorian novels was proposed by Janet Murray as a model of "the future of narrative in cyberspace." The viability of this model is questionable for a number of reasons: technological, algorithmic, but above all psychological. What kind of gratification will the experiencer receive from becoming a character in a plot patterned after a novel or drama? In the scenario discussed by Murray, Kathryn Janeway, the commander of the starship *Voyager*, sneaks into the Holodeck and becomes Lucy, the governess of the children in an aristocratic household. Lucy falls in love with the father of the children, Lord Burley, and they exchange passionate kisses, but the very responsible Kathryn realizes that this love for a virtual human is detrimental to the fulfillment of her duties in the real world, and she eventually orders the computer to delete the character. It is as if narrative, whether print or digital, were only good for those readers who throw the text away midway through their reading.

The personal experience of many fictional characters is so unpleasant that users would be out of their mind—literally as well as figuratively—to want to live their lives in the first-person mode. If we derive aesthetic pleasure from the tragic fate of literary characters such as Anna Karenina, Hamlet, or Emma Bovary, if we cry for them and fully enjoy our tears, it is because our participation in the plot is a compromise between identification with the character and distanced observation. We simulate mentally the inner life of these characters, we transport ourselves in imagina-

tion into their mind, but we remain external witnesses. But in the *Star Trek* Holodeck, which is a simulation of the interactor's experiences, the interactor experiences emotions directly. This concept proposed by Kendall Walton suggests that every novel can be successfully simulated in the first-person perspective of its main character and consequently not only the first-person perspective of its main character but also the first-person perspective of its main character would we want to share the subjective experience of Emma Bovary, Gregor Samsa in *The Metamorphosis*, Anna Karenina, or would we rather want to be the slaying hero of Russian fairy tales, like Prince Eric, Potter, and Sherlock Holmes? If we want to be on the second list, this means that we prefer to be a passive but active character whose participation is limited to emotional relation to other characters, rather than being a world, solving problems, participating in a world, solving problems, participating in a world against enemies. There may be a psychological bias overwhelmingly favoring certain types of participation. If an interactive narrative wants to exploit the full repertory of games and develop a rich range of truly poignant experiences, it must move away from a largely observatory role, rather than the role of the experiencer.

contemplation. The kaleidoscopic works very well with visual elements, to represent anything, and to a certain extent, because the predominantly symbolic of poetry leaves much more interpretive space than texts whose meaning depends on sequence. Narrative not only relies on a causal, rather than symbolic, model of the world, but also attempts to make sense out of life and to act through purposeful action, this is not the case with events through aleatory processes. The events in a simulation game, but these events must be rational, if they are interpreted as a story.

A story is the ultimate narrative experience by the Holodeck, whose simulation is used by Janet Murray as a model of cyberspace. The viability of this model has several reasons: technological, algorithmic, and psychological. What kind of gratification will become a character in a plot pattern in the scenario discussed by Murray, the commander of the starship *Voyager*, sneaks aboard the ship, the governess of the children, Lucy, falls in love with the father of the ship, exchange passionate kisses, but the fact is that this love for a virtual human being is not of her duties in the real world, and the computer to delete the character. It is as if the computer, were only good for those reading, midway through their reading.

For many fictional characters is so unattainable out of their mind—literally as well as figuratively in their lives in the first-person mode. If we look at the tragic fate of literary characters, Hamlet, or Emma Bovary, if we shed our tears, it is because our participation in the story is between identification with the character and observation. We simulate mentally the events, we transport ourselves in imagina-

tion into their mind, but we remain at the same time conscious of being external witnesses. But in the interactive drama of the *Star Trek* Holodeck, which is of course an imaginary construct, the interactor experiences emotions "from the inside," to use a concept proposed by Kendall Walton (1990, 28–29). Just as not every novel can be successfully adapted to film, not every type of character and consequently not every type of plot lends itself to the first-person perspective of interactive drama. Given the choice, would we want to share the subjectivity of somebody like Hamlet, Emma Bovary, Gregor Samsa in *The Metamorphosis*, Oedipus, and Anna Karenina, or would we rather enter the skin of the dragon-slaying hero of Russian fairy tales, Alice in Wonderland, Harry Potter, and Sherlock Holmes? If we pick a character from the second list, this means that we prefer identifying with a rather flat but active character whose participation in the plot is not a matter of emotional relation to other characters but a matter of exploring a world, solving problems, performing actions, and competing against enemies. There may be a good reason why computer games overwhelmingly favor certain types of plot and user experience. If interactive narrative wants to expand the rather limited emotional repertoire of games and develop complex characters who undergo truly poignant experiences, it may have to limit user participation to a largely observatory role, rather than placing the user in the role of the experienter.

6. Interactive Fiction and Storyspace Hypertext

We all know that computers are programmable machines. This means, technically, that they execute commands, one after the other, in a tempo controlled by the pulses of an internal clock. This also means, in the domain of artistic expression, that the behavior of digital objects is regulated by the invisible code of a program. This program often plays a double role: it presides over the creation of the text, and it displays it on the screen. If we regard dependency on the hardware of the computer as the distinctive feature of digital media, then the various types of text-creating and text-displaying software (also known as "authoring systems") should be regarded as the submedia of digitality. It is evident that developments on the level of hardware had a crucial impact on the features of digital texts: for instance, faster processors and expanded storage capabilities allowed the integration of text, image, and sound, while the creation of large computer networks allowed communications between multiple users and the collaborative construction of the text. But the form and content of digital texts, as well as the reader's experience, are also affected by the underlying code.

In this chapter and the next, I propose to revisit the evolution of digital narrative over the past twenty-five years, presenting it as the story of the relations between software support and textual products and asking of each authoring system: what are its special affordances; and how do these affordances affect the construction of narrative meaning? I will limit my investigation to texts composed by individuals or small groups, as opposed to texts produced

by corporate teams working with computers. I will ignore commercial video games and other domains of narrative activity in order to focus on the

In chapter 5 I define four basic properties of digital activity / reactivity, volatility of information, channels, and networking, singling out the most important. A text that takes advantage of one or more of these properties is called a digital medium. This attention to the properties of the medium directions: starting from an idea, what will best serve this idea; or starting from a question, what can I do with it. The second direction is because very few people are professional writers. With "old media" the artist can rely on a long established tradition, but with recently developed digital media of the language of the medium (or the medium of artistic activity). But whether or not a digital medium is ultimately a value judgment, it is a judgment. This judgment acknowledges an original experience that cannot be repeated in a digital medium, an experience that makes the medium unique. Thinking with the medium is not just using all the features offered by the authoring system, but a promise between the affordances of the medium and narrative meaning. Nor is thinking with the medium, with thinking *about* the medium, but a recently fashionable habit of sprinkling digital media with comments on the nature of digital media. Thinking with its medium does not just inspire readers to do the thinking

Interactive Fiction

The first narrative genre that grew out of the digital environment was a hybrid of game and narrative, called Interactive Fiction (henceforth abbreviated as IF). The first IF games produced by the now defunct Infocom company, especially the *Zork* adventures (1980-1982), are what I mostly remember. *Mindwheel* (1983) was written by the poet Robert Pinsky. The first IF games on personal computers first made the

Interactive Fiction and Space Hypertext

programmable machines. This execute commands, one after the other pulses of an internal clock. This is a staccato expression, that the behavior is determined by the invisible code of a program. The invisible role: it presides over the creation on the screen. If we regard dependence on the computer as the distinctive feature of these types of text-creating and text-naming systems ("authoring systems") should be a consequence of digitality. It is evident that development had a crucial impact on the features of the computer processors and expanded storage of text, image, and sound, computer networks allowed communication and the collaborative construction of content of digital texts, as well as the effects by the underlying code.

I propose to revisit the evolution of the last twenty-five years, presenting it as a dialogue between software support and textual authoring system: what are its special affordances affect the construction of text? This is the topic of my investigation to texts composed, as opposed to texts produced

by corporate teams working with a large budget. This means that I will ignore commercial video games, one of the most productive domains of narrative activity in digital media.

In chapter 5 I define four basic properties of digital media: interactivity / reactivity, volatility of inscription, multiple sensory channels, and networking, singling out interactivity as the most prominent. A text that takes advantage in a narratively significant way of one or more of these properties is a text that thinks with its medium. This attention to the properties of the medium can go in two directions: starting from an idea and looking for the medium that will best serve this idea; or starting from a medium and asking: what can I do with it. The second direction is the most common because very few people are proficient in more than one medium. With "old media" the artist can seek inspiration from an established tradition, but with recently developed media, the discovery of the language of the medium (or its invention) is an integral part of artistic activity. But whether or not a text thinks with its medium is ultimately a value judgment rather than an objective observation. This judgment acknowledges the text's ability to create an original experience that cannot be duplicated in any other medium, an experience that makes the medium seem truly necessary. Thinking with the medium is not the overzealous exploitation of all the features offered by the authoring system but an art of compromise between the affordances of the system and the demands of narrative meaning. Nor is thinking *with* the medium synonymous with thinking *about* the medium, a formula that describes the currently fashionable habit of sprinkling digital texts with theoretical comments on the nature of digital textuality. A work that truly thinks with its medium does not *have* to think about it, because it inspires readers to do the thinking themselves.

Interactive Fiction

The first narrative genre that grew and ran exclusively in a digital environment was a hybrid of game and literature known as Interactive Fiction (henceforth abbreviated as IF). The classics of the genre are the games produced by the now defunct company Infocom, especially the *Zork* adventures (1980), but the literary minded will mostly remember *Mindwheel* (1984), a so-called electronic novel written by the poet Robert Pinsky. Born in the early eighties, when personal computers first made their appearance, IF is a dialogue

system in which the user, manipulating a character (henceforth referred to as the avatar), interacts with the machine not through the selection of an item from a fixed menu but through a relatively free production of text: the user can type whatever he wants, though the parser associated with the system will understand only a limited number of verbs and nouns. Nick Montfort defines interactive fiction as "a program that simulates a world, understands natural language text from an interactor, and provides a textual reply based on events in the world" (2004, 316). "In this genre of fiction," says the Web site of Inform, the authoring system most commonly used nowadays for the production of IF, "the computer describes a world and the player types instructions like touch the mirror for the protagonist character to follow; the computer responds by describing the result, and so on until a story is told."

All narratives can be said to describe a world, but the engine that operates IF goes one step further, in that it not only evokes a world through visible text but also constructs a *productive* model of this world through computer-language statements that the player never gets to see. These statements specify the general laws that define the avatar's range of options and determine the results of his actions. For instance, if Coca-Cola is described as both liquid and toxic in the computer's world-model, and if the avatar drinks a can of Coke, the action will result in his death. When the player takes an action, the system updates its model of the current state of the fictional world, for instance, by canceling the attribute "alive" of the avatar after he ingests poison. When the attributes of an object change, so do the various actions to which the object lends itself. Characters, for instance, are objects linked to scripted behaviors that enable them to move, to talk, or to die. When their attribute "alive" is turned off, their affordances are dramatically altered: their corpse can still be seen, picked up, or moved around by the player, but they are no longer able to act on their own. The system is a simulation, rather than a mere world-description, because the world-model allows not just one but a large number of different narratives to unfold. Video games added sensory channels to IF, and they allowed users to interact in real time rather than in suspended time through keyboard input that simulates physical action, but they owe much of their popularity to a common narrative formula, and they operate according to the same principles: building a dynamic model of a fictional world.

The coherence of the stories is ante-
ceded by the world-rules, and involves the player's character. With each other, or with commands becomes illogical or unpredictable. In a standard narrative there is liquid, because the reader will imbibe the substance with the real-world experience; but in IF specified in the invisible code, the narrative depends as much on the reader's inferential capacity as on the reader's inferential capacity.

The interactive fiction engine is a narrative. The first, and most widespread, a type that also dominates archetypal pattern, the player-hero on a journey through the fictional world, various places and passes various information gathered along the way.

The importance of travel across means that the design of this type of a geography made up of distinct (polygon) connected by a network of observes: "Game designers don't worlds and sculpt space" (2004, fictional world specifies what sites and what objects are contained in of the robbers, for instance, it may est, or to crawl west through a nar holds the treasure, but the player the north or to the south unless sh floor of the cave. To play the gam struct a mental map, and sometime world. The various locations with associated with certain objects, sers false leads or mere decoration. computer games in general is clo detective novels than to the logic hanging on the wall will not necess

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The coherence of the stories generated by the system is guaranteed by the world-rules, and by the fact that every episode involves the player's character. When the world-rules are inconsistent with each other, or with common world knowledge, the narrative becomes illogical or unpredictable. For instance, if Coca-Cola is not defined as liquid, the system will block the avatar's attempt to imbibe the substance with the message "you cannot do that." In a standard narrative there is no need to mention that Coke is liquid, because the reader will make the inference on the basis of real-world experience; but in IF, every relevant property must be specified in the invisible code, since the proper development of the narrative depends as much on the knowledge-base of the computer as on the reader's inferential capabilities.

The interactive fiction engine supports two main types of narrative. The first, and most widely represented, is the puzzle-based quest, a type that also dominates the video game industry. In this archetypal pattern, the player-hero receives a mission and sets out on a journey through the fictional world, during which he visits various places and passes various tests with the help of objects or information gathered along the way.

The importance of travel across space in the quest narrative means that the design of this type of IF begins with the creation of a geography made up of distinct sites (or "rooms," in the jargon) connected by a network of passageways. As Henry Jenkins observes: "Game designers don't simply tell stories; they design worlds and sculpt space" (2004, 121). The underlying map of the fictional world specifies what sites are adjacent to every location, and what objects are contained in the various areas. From the cave of the robbers, for instance, it may be possible to go east to the forest, or to crawl west through a narrow shaft to the secret room that holds the treasure, but the player cannot go through the wall to the north or to the south unless she picks up a magic pebble on the floor of the cave. To play the game efficiently, the player must construct a mental map, and sometimes a graphic map, of the fictional world. The various locations within game geography are usually associated with certain objects, some useful to the quest, the others false leads or mere decoration. The narrative logic of IF and of computer games in general is closer to the mode of operation of detective novels than to the logic of drama, in that a gun shown hanging on the wall will not necessarily fire, contrary to Chekhov's

prescription for a well-constructed play. In a game narrative, it is indeed part of the player's task to sort out what will fire and what will not.

Though the world-model allows different narratives to unfold—in principle a new one for each game-session—these narratives are not all equally satisfying to the player: some end with the fulfillment of the mission, others lead to the death of the avatar. To parody Tolstoy, we can say that the unhappy narratives are unhappy in many different ways, while the happy narratives all follow the same route. It is, however, important to distinguish the variable stories created by the player's actions from the predetermined "master narrative" (or narratives) written into the system as the solution(s) of the game. As P. Michael Campbell argues (1987, 82), the variable stories of the avatar's life differ from each other through what Roland Barthes (1977) calls "satellite" elements, but they all traverse the same "kernels." Whereas one player will make ten unsuccessful attempts to open the door that leads to the treasure, another will use the right tool right away. The adventures of these two players (or rather, of their avatars) in the gameworld will produce different sequences of events and bring different text to the screen, but both players will eventually perform the same actions to complete the master plot. As Nick Montfort observes, "winning" is getting the whole story; "losing" is causing the story to end prematurely (online, 6). The master plot thus functions as the player's reward for allowing his avatar to fulfill his mission. Whether the player wins or loses, however, the story achieves closure when the system is no longer able to modify the state of the fictional world (Montfort online, 11).

Reading (and playing) for the master plot is not the only way to approach IF, or computer games in general. For the true connoisseur, one of the special pleasures of the genre lies in trying to evade the control of the game-designer, in the best tradition of deconstructive reading. A world-model in which every law, as well as every property of every object, must be specified is bound to present inconsistencies and fatal omissions. The subversive reader will engage in an active search for these bugs, in the hope of coaxing unplanned stories or delightful nonsense out of the system. Espen Aarseth (1997, 123–24) describes a particularly amusing bug in Marc Blank's *Deadline* (1982), a mystery story in which the player must find the murderer of a wealthy businessman, Mr. Robner. If

the player maliciously decides that the system will forget that he is dead, he can strike up a conversation with the system and the player to arrest Mr. Robner for insufficient evidence, but if the player decides to declare the mystery solved and end the game, the designers may of course anticipate this and purposefully introducing interesting events into the program. As Nick Montfort, game master in Pinsky's *Mindwheel*, says, "the reader from his quest and to chat with an entertaining bot." The former second baseman for the Boston Red Sox, *Mindwheel*, . . . the 'misreading' of the text, what incorporated into the text, the story will play along" (1987, 11).

By inviting the user to play with the system exclusively on advancing in the game, the system in chapter 8 as *paidia* versus *ludus*. The second form of IF narrative: a conversational character (chatterbot, in the jargon of the landmark AI program that began the career in 1966. In this type of IF narrative, the entire action takes place in the problem to be solved is eliciting a response from the character. Narrative in these texts is constituted by the stories told by the system, but occasionally the player—the system—and the other created by the evolution of the player and the character in the conversation.

One of the best examples of this is the story *Galatea*. In this text, you play as a sculptor who comes across a statue of a woman, Pygmalion.¹ According to legend, Pygmalion fell in love with Galatea, and in answer to his prayer, she became a living statue. But not in Short's version of the story, where Galatea is a lifeless statue, but he is upset when she is no longer a passive (sex?) object. To possess her entirely, he sells her to a man who will kill her. Out of this common narrat

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ws different narratives to unfold— a game-session—these narratives the player: some end with the full lead to the death of the avatar. To it the unhappy narratives are un- while the happy narratives all follow important to distinguish the vari- r's actions from the predetermined es) written into the system as the Michael Campbell argues (1987, avatar's life differ from each other 1977) calls "satellite" elements, but els." Whereas one player will make open the door that leads to the treat- t tool right away. The adventures of their avatars) in the gameworld s of events and bring different text will eventually perform the same plot. As Nick Montfort observes, story; "losing" is causing the story The master plot thus functions as g his avatar to fulfill his mission. es, however, the story achieves clo- ger able to modify the state of the e, 11).

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the player maliciously decides to interview Mr. Robner himself, the system will forget that he is dead, and the player will be able to strike up a conversation with him. The system will not allow the player to arrest Mr. Robner for his own murder, invoking insuffi- cient evidence, but if the player shoots Mr. Robner, the system will declare the mystery solved and will send the player to jail. Clever designers may of course anticipate the reader's subversive game by purposefully introducing interesting bugs or opportunities for mis- reading into the program. As P. Michael Campbell observes, the game master in Pinsky's *Mindwheel* tries his best to distract the reader from his quest and to coax him into spending more time chatting with an entertaining bum who happens to be Gil Hodges, the former second baseman for the Brooklyn Dodgers. "Here, in *Mindwheel*, . . . the 'misreading' process has been at least some- what incorporated into the text. It's OK to play around in the story; the story will play along" (1987, 79).

By inviting the user to play with the system, rather than focusing exclusively on advancing in the game—a contrast that I will describe in chapter 8 as *paidia* versus *ludus*—*Mindwheel* anticipates the sec- ond form of IF narrative: a conversation with a system-generated character (chatterbot, in the jargon) reminiscent of ELIZA, the landmark AI program that began its distinguished psychoanalytical career in 1966. In this type of IF there are no puzzles and no geog- raphy: the entire action takes place in the same room, and the only problem to be solved is eliciting interesting confessions from the character. Narrative in these texts appears on two levels: one con- stituted by the stories told by the participants—mostly the charac- ter but occasionally the player—during their conversational turns, and the other created by the evolution of the relations between the player and the character in the course of the exchange.

One of the best examples of this type of IF is Emily Short's *Galatea*. In this text, you play the role of a visitor to an art gal- lery who comes across a statue by the famous Greek sculptor Pygmalion.¹ According to legend, Pygmalion fell in love with Galatea, and in answer to his prayers Aphrodite gave life to the statue. But not in Short's version: here Pygmalion loved the life- less statue, but he is upset when Galatea wakes up because she is no longer a passive (sex?) object. Frustrated in his desire to pos- sess her entirely, he sells her to a collector and later commits sui- cide. Out of this common narrative core, the text develops several

different stories. In one version Galatea confesses her unhappy love for Pygmalion; in another, she plays psychoanalyst to the player, like her model ELIZA; in yet another, the player tells her that she is an AI-created agent, and she is so mad at being called a machine that she strangles him; in still another version, a spoof of Internet romances, the player discovers that she is an avatar manipulated by a rather dumpy female who inspires none of the feelings that the player experiences for the beautiful statue. (This is only a partial list.) Winning in this literary game means unraveling one of the stories written into the system and reaching the words "the end," but there is considerable pleasure in just conversing with Galatea, for she has a lot to say about important subjects: love, art, the gods, feminism, and of course herself. (In one of the stories, she can even be made to be preoccupied with something other than her own person!)

Getting the statue to tell stories is not an easy task, because the player must formulate queries in a way that will be understood by the parser. In the ELIZA program, users could type whatever they wanted, and Eliza always had a canned response, though these responses were rarely to the point: the chatterbot just grabbed a keyword from the user's input and built it into a sentence of her own. When she was at a loss for a response, she turned the player's input into a question. It was left to the user's imagination to make the conversational inferences that would lend coherence to the exchange. In *Galatea*, the parser accepts only a small number of queries, but this limitation pays off in two ways: it allows the system to provide much more relevant answers than ELIZA could offer; and it also makes it possible to keep track (at least to some extent) of the flow of the conversation. The same input by the user will elicit different reactions from Galatea, depending on what mood she is in—a mood determined by the user's previous actions. Most attempts to get her to kiss you will fail:

PLAYER: Galatea, kiss me

SYSTEM: Either she doesn't hear the suggestion, or she deems it unworthy of response

But if you have properly courted her, you will get your reward, though it may not be clear to you why Galatea cooperates in one case and refuses to come down from her pedestal in the other: statues (especially statues of beautiful women) are unpredictable!

PLAYER: Galatea, come down

SYSTEM: "Er . . .?"

PLAYER: Galatea, kiss me

SYSTEM: She turns so that she

gaze, smoky eyes, brows pa

her more beautiful angle, w

eyes meet yours, a swift flic

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After a moment you disentang

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The End

Another difference between makes no assumptions about narrative-oriented program, s user within the developing pl his attempts to receive a kiss fr the dumpy female who speaks most versions as male, though bility of a queer reading. The evident when you try to tell so and the system rewords and exp

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 her more beautiful angle, which might be why she avoids it. Her
 eyes meet yours, a swift flicker of darkness. She puts a hand on
 your shoulder for support, leans down—

After a moment you disentangle your fingers from her hair. "Come
 on," you say. "There are things we should talk about, and this
 is not the place."

The End

Another difference between *Galatea* and ELIZA is that ELIZA
 makes no assumptions about your identity, while *Galatea*, a
 narrative-oriented program, scripts the role and persona of the
 user within the developing plot. Through his gazing at Galatea,
 his attempts to receive a kiss from her, his dejection when he sees
 the dumpy female who speaks through her, the user is projected in
 most versions as male, though I don't want to exclude the possi-
 bility of a queer reading. The scripting of the user is particularly
 evident when you try to tell something about yourself to Galatea,
 and the system rewords and expands your query:

PLAYER: tell parents

SYSTEM: "My parents died when I was fairly young," you say. "So
 I don't remember them well. Mostly just images. My mother
 played the violin, and I remember her getting ready to go play
 for a Scottish dance group. She was all dressed up and about to
 go, but she stopped to play one tune for me and my sister before
 she left."

A pause. "We didn't see her again, though something tells you
 she's already guessed as much."

Though *Galatea* is not really an AI program and stands little
 chance of winning the Turing award, the system can sustain a re-
 markably coherent conversation if the user cooperates. ELIZA al-
 ways had a response in stock, because the program picked words
 from the user's input or abruptly changed the subject, but Galatea,
 a much more discriminating conversationalist, limits her responses
 to relevant topics. The best way for the human user to get Galatea

to talk is to adopt ELIZA's own strategy: choose a key word from the statue's previous turn and ask her about it. By selecting only current topics, this approach respects the philosopher H. P. Grice's cooperation principle for conversation: "Make your conversational contribution such as required, at the stage at which it occurs, by the accepted purpose or direction of the talk in which you are engaged" (Grice 1975, 47). If you fail to focus your contributions on relevant topics, you may get the conversation-killing response: "Galatea doesn't know what you are talking about." This can lead to humorous effects, for instance, when you ask her about truth.

For the narratologist, IF is a gold mine of illocutionary situations, discourse modes, and interplay of diegetic levels that expands significantly the technical repertory of language-based narrative. Usually told in the second person and in the present tense, IF is one of the rare narrative forms where the use of "you" enters into a truly dialogical rather than merely rhetorical relation with an Other, and where "present" denotes narrow coincidence between the time of the narrated events and the time of the narration. Rather than imaginatively preexisting the act of narration, the events of the fictional world are made to happen at the very moment of their description through the performative force of the discourse that appears on the screen.

The most distinctive narratological features of IF, when compared to either print narrative or to the other digital forms discussed in this chapter, is the construction of the story through a movement that leads in and out of the diegesis—in and out of the fictional world. Standard narrative fiction adopts a unified, world-internal point of view. But in IF, some utterances can be attributed to a narrator situated within the fictional world, for instance:

PLAYER: Kill Mr. Robner

SYSTEM [as narrator]: With a lethal blow of your hand, Mr. Robner falls dead. Your mind becomes confused amidst strange screaming, yelling, and the pangs of your conscience. "How could I have done it?" you ask yourself, as you hear the distant sound of police sirens. Sergeant Duffy and two other officers enter and grab you rather unceremoniously.

(Mark Blank, *Deadline*; quoted from Aarseth 1997, 123–24)

while others (marked in italics in the example below) represent an external voice, the voice of the system that produces the story in collaboration with the player:

SYSTEM [as narrator]: A plain room
near the alley's end. It's firm

PLAYER: Open door

SYSTEM: *You don't see how.*

PLAYER: Scream in despair.

SYSTEM: *That's not a verb I rec*

(From Plotkin, *Spider and Web*)

These interventions of the system are processed. In this example the player is stepping out of the fictional world. In *Galatea*, the problem can be handled by turning the misunderstanding as part of the game. The player may simply say "I don't understand." The system, stepping out of role, or the reporter, may be turned over to a narratorial voice. The system may say "you are talking about" (*Galatea*). This intervention involves the character and the player in the fictional world, while in the real world, it is located on the level of the real-world game and the game.

A similar differentiation between the fictional and extradiegetic (world-external) levels of the player's input. When the player speaks in the name of his avatar, the player's input is an integral part of the narrative.

SYSTEM: Interrogation chamber [facing a man behind a desk].

SYSTEM [as character]: You're going to get through that door. Do you want to?

PLAYER [to the character]: Yes.

SYSTEM [as narrator]: The man notices the least important detail.

(From Plotkin, *Spider and Web*)

On the other hand, when the player's action, usually through a two-way dialogue, is mediated by the system as part of the narrative, the system is external to the text. Rather than telling the player, the system states to the system the development of the story. Asking a parent: "Tell me a story"

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SYSTEM [as narrator]: A plain metal door faces you to the east,
near the alley's end. It's firmly shut.

PLAYER: Open door

SYSTEM: *You don't see how.*

PLAYER: Scream in despair.

SYSTEM: *That's not a verb I recognize.*

(From Plotkin, *Spider and Web*)

These interventions of the system all concern input that cannot be processed. In this example the unrecognizable verb is signaled by stepping out of the fictional world; but in a dialogue system such as *Galatea*, the problem can be handled intradiegetically by presenting the misunderstanding as part of the conversation. The character may simply say "I don't understand what you are saying" without stepping out of role, or the report of the miscommunication can be turned over to a narratorial voice: "She clearly doesn't know what you are talking about" (*Galatea*). In this case the misunderstanding involves the character and the player's avatar, and it takes place in the fictional world, while in the *Spider and Web* example it is located on the level of the real-world interaction between the player and the game.

A similar differentiation between intradiegetic (world-internal) and extradiegetic (world-external) utterances can be found in the player's input. When the player dialogues with a character, he speaks in the name of his avatar within the fictional world, and his input is an integral part of the narrative. For instance:

SYSTEM: Interrogation chamber [You are imprisoned in a chair,
facing a man behind a desk].

SYSTEM [as character]: You're going to start by telling me how you
got through that door. Do you understand me?

PLAYER [to the character]: Yes.

SYSTEM [as narrator]: The man nods briefly—a man satisfied with
the least important detail.

(From Plotkin, *Spider and Web*)

On the other hand, when the player makes his avatar perform an action, usually through a two-word sentence, his input is not treated by the system as part of the narration but as a command external to the text. Rather than telling the story himself, the player dictates to the system the development of the story, as would a child asking a parent: "Tell me a story about a unicorn that marries a

dragon." The system fulfills the command by expanding the player's input into a more vivid description of the event, and by detailing its consequences:

PLAYER [to the system]: Kiss Gil.

SYSTEM [as narrator]: You purse your sensuous lips and give one of the bums a medium-long, fairly wet kiss.

Fine—while your civilization totters on the brink of utter destruction, you managed to kiss, in splendid fashion, one of the bums but your quest for WHEEL OF WISDOM has not advanced.

(From Pinksy, *Mindwheel*, quoted from Campbell 1987, 78)

Much, arguably too much, has been made of the creative role of the reader in digital environments. The fact that the system of IF rewrites most of the player's input seriously dampens the claim that interactivity turns the reader into a coauthor: even though the player interacts through language, most of her contributions are treated as paratext, and she does not participate directly in the writing process.

Storyspace Hypertext

In the late 1980s two factors contributed to the commercial demise of interactive fiction.² For lovers of games, the fatal blow was dealt by the development of graphic interfaces. The textual screen of the earlier *Zork* episodes looked rather bleak, compared to the visually rendered gameworld, the film clips, and the talking characters of the later installments. Meanwhile, for lovers of literature, IF was out staged by hypertext, a new digital genre that burst onto the scene with a blaze of theoretical publicity. How could a mere game compete in intellectual sophistication with a genre that was heralded as "a vindication" (Bolter 1992, 24) of the ideas of Barthes, Foucault, Derrida, Deleuze, Guattari, and Kristeva on the nature of textuality?³

Most of us associate digital textuality with hypertext, and most of us associate hypertext with texts composed from the late eighties to mid-nineties with the authoring program Storyspace: works such as Michael Joyce's *afternoon: a story*, Stuart Moulthrop's *Victory Garden*, and Shelley Jackson's *Patchwork Girl*, all sold by Eastgate Systems. The developers of Storyspace were Jay David Bolter, a classics scholar turned media theorist; Michael Joyce, a novelist; Mark Smith, a programmer; and Mark Bernstein, the owner of

Eastgate Systems. The program kept text in mind, and for many readers the canonical form of hypertext was the extent *Victory Garden* and *Patchwork Girl*, the classics of the genre. But Storyspace was also a tool for the construction of new texts; the vision of the developers was the vision of a system who coined the term "hypertext" and a giant computer network called Xanadu. The vision of texts would be gathered and only facilitate the retrieval of documents. Creative thinking by blazing associations. Xanadu was going to be "a universe where other data may be mapped" (quoted in the vision eventually came to life as a linking system that Nelson had articulated and versatile than the htr and Montfort 2003, 441).⁴

In keeping with Nelson's en vision, Storyspace envisioned the program as complex networks of ideas. Since it dealt with relatively small chunks of text, it required vast systems of links and nodes. Stuart Moulthrop's hypertext *Victory Garden* nodes (lexia, in the jargon) could be more than even the most dedicated reader could read in a reasonable time. This level of complexity was not technically feasible without the feature of allowing users to save readings.

Compared to the Inform engine, Storyspace was a simpler program. There is no need to write code; the process is only slightly more complex than using a word processor. While Inform fictions interact with the machine through language, Storyspace is sensitive to the clicking of the mouse. The fictional world on the basis of rules that control the artificial intelligence component (the avatar) is in the fictional world. Storyspace limits its operation to the manipulation of textual fragments, without any knowledge of the

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Eastgate Systems. The program was designed with a certain type of text in mind, and for many readers this model has come to pass as the canonical form of hypertext fiction: *afternoon*, and to a lesser extent *Victory Garden* and *Patchwork Girl* are indeed regarded as the classics of the genre. But Storyspace was not exclusively meant as a tool for the construction of literary texts. A major influence on the developers was the vision of Ted Nelson, a computer scientist who coined the term "hypertext" in 1965. Nelson dreamed of a giant computer network called Xanadu, through which millions of texts would be gathered and interlinked. These links would not only facilitate the retrieval of documents; they would also promote creative thinking by blazing associative trails through the database. Xanadu was going to be "a universal data structure to which all other data may be mapped" (quoted by Bolter 1991, 102). Nelson's vision eventually came to life as the World Wide Web, though the linking system that Nelson had in mind for Xanadu is more sophisticated and versatile than the html links of the Web (Wardrip-Fruin and Montfort 2003, 441).⁴

In keeping with Nelson's encyclopedic vision, the authors of Storyspace envisioned the program as a tool for the organization of complex networks of ideas. Since the units of Storyspace work best with relatively small chunks of text, Storyspace projects tend to require vast systems of links and nodes. To take an extreme example, Stuart Moulthrop's hypertext *Victory Garden* has no less than 993 nodes (lexia, in the jargon) connected by 2,804 links—far more than even the most dedicated reader will be able to visit in a reasonable time. This level of complexity would not have been practically feasible without the feature of the bookmark, which allowed users to save readings.

Compared to the Inform engine, Storyspace is a very simple program. There is no need to write code, and the composition process is only slightly more complicated than writing with a word processor. While Inform fictions enable the reader to communicate with the machine through language, Storyspace responds exclusively to the clicking of the mouse.⁵ And while Inform constructs a world on the basis of rules that can be regarded as a rudimentary artificial intelligence component (it knows, for instance, where the avatar is in the fictional world and what objects he is carrying), Storyspace limits its operation to the mechanical combination of textual fragments, without any knowledge of their content. Instead

of keeping an internal representation of the evolving state of the fictional world, and of sifting a database of logical rules to decide what episode can follow another, Storyspace only needs to perform jumps to certain memory addresses and to display their data when the user clicks on a word designated as link. This makes Storyspace hypertexts much more deterministic in their mode of operation than interactive fiction.

A Storyspace hypertext is a network of links and nodes, also called *lexia*. The *lexia* correspond to units of text, the digital equivalent of the page, though the program also allows nodes to be filled with graphic and sound files. But multimedia capabilities were very limited in the early versions of Storyspace, and the classic hypertexts make little or no use of pictures. *afternoon*, for instance, is entirely verbal. When the user clicks on a link, the system displays a new page on the screen. Since there are usually several links on a page, the reader can activate several different *lexia*, which means that the order of presentation of the *lexia* is variable. This property of hypertexts is generally known as nonlinearity, though multilinearity would be a better term, since the reader's choices inevitably result in a sequential order. In most hypertexts the words that serve as anchors to the links are marked with special fonts, to make them visible to the reader; but this feature is optional. In *afternoon*, for instance, the links remain hidden. This turns the reader's exploration of the text into a blind navigation, or into a search for Easter eggs—the Easter eggs of what Joyce calls “the words that yield.”

One of the most distinctive features of the Storyspace system is the possibility of placing conditions on the activation of links. This feature, known as guard field, prevents a link from being followed until a specific node has been visited.⁶ The use of guard fields enables authors to exercise a secret control over the itinerary of the reader through the text, but this control is always limited, because the networks are far too large, and the links far too numerous, for the designer to take into consideration all the possible actions of the reader. A good example of a clever use of a guard field is found in *afternoon*: as J. Yellowlees Douglas observes (2000, 100), readers cannot reach a *lexia* that suggests the narrator's responsibility for the accident that (maybe) killed his son and ex-wife before they visit another *lexia* that describes a therapy session with a psychologist. This sequence suggests that the dialogue with the therapist unlocked guilt feelings in the narrator or led to a more lucid self-awareness.

To help authors keep the control, Storyspace generates a map of the state of the developing network. For finished products, for instance, the map is available to the reader as part of the text. In *afternoon*, keep the map hidden; in *Patchwork Girl*, the map enables the reader to bypass the author. In *Patchwork Girl*, you can see the map by clicking on its icon. Storyspace hypertexts are much more complex on a screen, maps cannot be displayed, they represent subsections of the text. The best when the text is structured. The generated maps that appear as part of the text that they are always available) externally produced maps (artwork). In this case again, clicking on the map take the reader to the corresponding text. The maps are harder to consult than the screen.

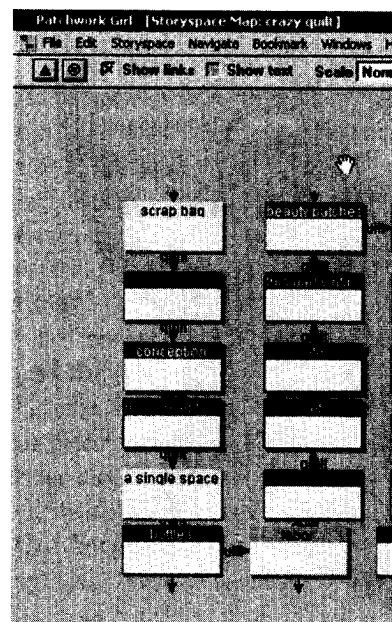


Figure 5. Storyspace map: the “Crazy Quilt” from *Patchwork Girl*. Reproduced by permission of Eastgate Systems.

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etwork of links and nodes, also to units of text, the digital equivalent also allows nodes to be filled multimedia capabilities were very Storyspace, and the classic hyper- tures. *afternoon*, for instance, is cks on a link, the system displays here are usually several links on a eral different lexia, which means the lexia is variable. This prop- own as nonlinearity, though multi- since the reader's choices inevita- n most hypertexts the words that marked with special fonts, to make s feature is optional. In *afternoon*, den. This turns the reader's explo- igation, or into a search for Easter yce calls "the words that yield."

atures of the Storyspace system is ons on the activation of links. This vents a link from being followed sited.⁶ The use of guard fields ent control over the itinerary of the control is always limited, because nd the links far too numerous, for ation all the possible actions of the ver use of a guard field is found in glas observes (2000, 100), readers sts the narrator's responsibility for is son and ex-wife before they visit therapy session with a psychologist. dialogue with the therapist unlocked d to a more lucid self-awareness.

To help authors keep the complexity of the database under control, Storyspace generates a map (Figure 5) that shows the current state of the developing network of links and nodes. Some of the finished products, for instance *Patchwork Girl*, make these maps available to the reader as part of the interface, while others, such as *afternoon*, keep the map hidden. The possibility to consult the map enables the reader to bypass the system of links designed by the author. In *Patchwork Girl*, you can indeed reach any node visible on the map by clicking on its image. But because the networks of Storyspace hypertexts are much larger than what can be shown on a screen, maps cannot be displayed in their totality, unless they represent subsections of the text. The map idea works therefore best when the text is structured in layers. In addition to system-generated maps that appear as part of the interface (which means that they are always available), Storyspace hypertexts may place externally produced maps (artworks) within one of their nodes. In this case again, clicking on the various items on the map will take the reader to the corresponding area in the text. These maps are harder to consult than the system-generated maps, because the

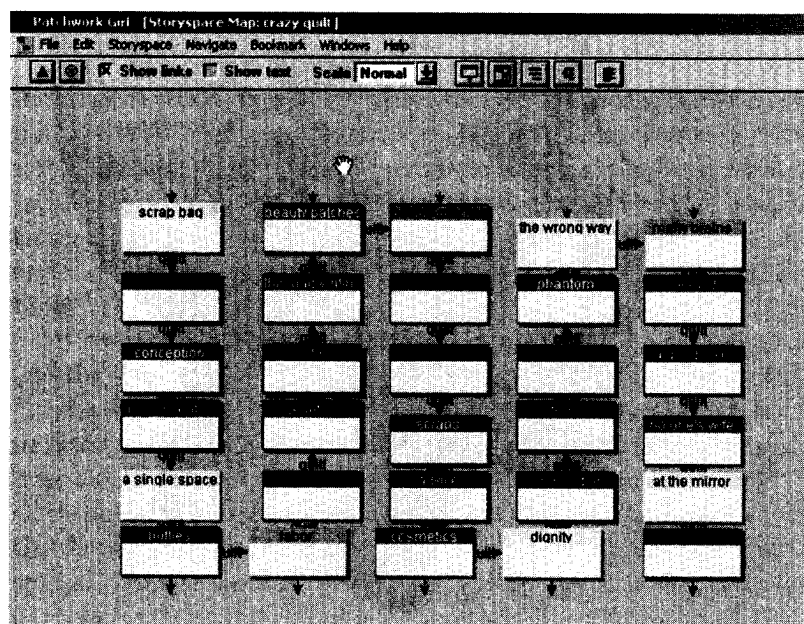


Figure 5. Storyspace map: the "Crazy Quilt" section of Shelley Jackson's *Patchwork Girl*. Reproduced by permission of Eastgate Systems Inc. <http://www.eastgate.com>.

reader must first find the node in which they are contained, but their function is usually more emblematic than navigational: most of them provide an image of the text that fixes its identity in the mind of the reader. In *Victory Garden*, the “artwork” map looks like a garden with benches and paths; in *Patchwork Girl* (a text that includes both system-generated and artwork maps), like an anatomical drawing of the brain (Figure 6); and in Deena Larsen’s *Marble Springs*, like the plan of the Colorado town whose collective story is told in the text.

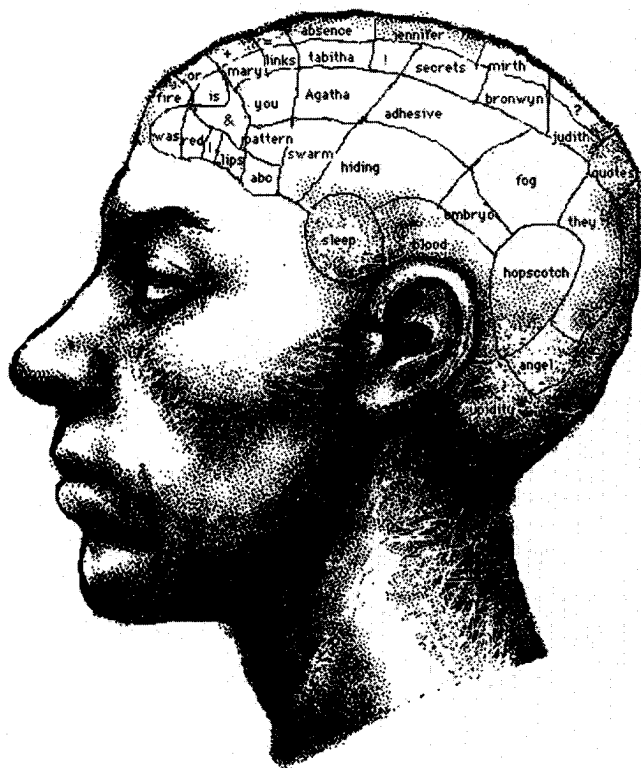
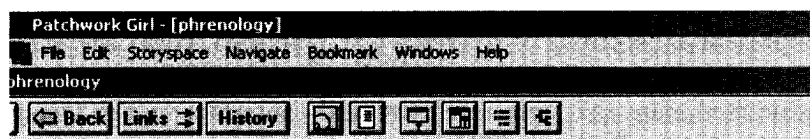


Figure 6. A non-system-generated map for the “Phrenology” section of *Patchwork Girl*. Reproduced by permission of Eastgate Systems Inc. <http://www.eastgate.com>.

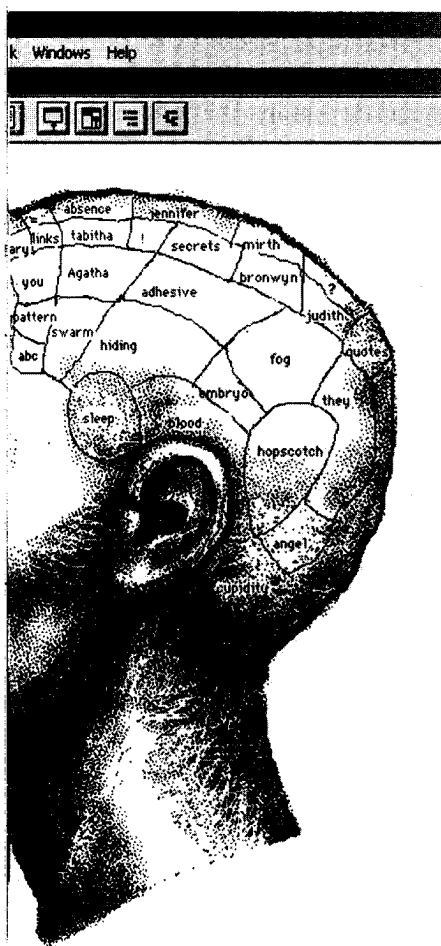
The maps of the Storyspace to come the most lasting legacy of the concept suggested by its name: the concept of forking paths. Let me take a case in point: the *Garden of Forking Paths*, which comes from Jorge Luis Borges, because it is widely considered the type of narrative that only hypertext can do. “*Garden of Forking Paths*” is not only the title of a novel described in the story, but it also refers to branches in time and not

In all fictional works, each time a choice of alternatives, he chooses one and eliminates the others. In the work of Ts’ui Pên, he chooses—simultaneously. In this way, diverse futures, diverse possibilities proliferate and fork. Here, then, contradictions . . . In the work of [of any action] occur; each one is a fork. Sometimes the paths of the future are ample, you arrive at this house, but in another, you are my enemy, in another, my friend.

In Borges’s story, Ts’ui Pên’s novel is not written. The embedding tale is not a traditional linear development. J. David Velleman lacked the proper medium to realize this. *Garden of Forking Paths* can only be implemented in hypertext. “The text can comprise a network of different paths at times” (1991, 139).⁷ I believe, however, that the official resemblance between the structure of Ts’ui Pên’s novel and the structure of *Garden of Forking Paths* is no more than a coincidence in print, even if it is limited to a superficial level, because the metaphor comes from a different

In both hypertext and Borges’s *Garden of Forking Paths* stands for a spatial, but the similarity ends there. The process fundamental to human cognition is the spatial image of the forking paths to a temporal phenomenon.⁸ In possible v

le in which they are contained, but emblematic than navigational: most the text that fixes its identity in the y Garden, the "artwork" map looks nd paths; in *Patchwork Girl* (a text nerated and artwork maps), like an ain (Figure 6); and in Deena Larsen's of the Colorado town whose collec-



ap for the "Phrenology" section of *Patchwork*
stgate Systems Inc. <http://www.eastgate.com>.

The maps of the Storyspace toolbox account for what has become the most lasting legacy of the system—a legacy also suggested by its name: the conceptualization of hypertext narrative in terms of spatial metaphors, such as the labyrinth or the Garden of Forking Paths. Let me take a closer look at the metaphor of the Garden of Forking Paths, which comes from a short story by Jorge Luis Borges, because it is widely regarded as an emblem of the type of narrative that only hypertext can deliver. "The Garden of Forking Paths" is not only the title of a story by Borges but also the title of a novel described in the story. In this novel, the metaphor refers to branches in time and not in space:

In all fictional works, each time a man is confronted with several alternatives, he chooses one and eliminates the others; in the fiction of Ts'ui Pên, he chooses—simultaneously—all of them. *He creates*, in this way, diverse futures, diverse times which themselves also proliferate and fork. Here, then, is the explanation of the novel's contradictions . . . In the work of Ts'ui Pên, all possible outcomes [of any action] occur; each one is the point of departure for other forkings. Sometimes the paths of this labyrinth converge: for example, you arrive at this house, but in one of the possible pasts you are my enemy, in another, my friend. (Borges 1962, 26)

In Borges's story, Ts'ui Pên's novel remains virtual, described, but not written. The embedding tale is a suspense story with a traditional linear development. J. David Bolter claims that Borges simply lacked the proper medium to realize the idea: the Garden of Forking Paths can only be implemented in "an electronic space, in which the text can comprise a network of diverging, converging, and parallel times" (1991, 139).⁷ I believe, however, that there is only a superficial resemblance between the spatial organization of hypertext and the structure of Ts'ui Pên's novel, and that Borges's idea of the Garden of Forking Paths is no more feasible in hypertext than it is in print, even if it is limited to a subset of the infinite field of the possible, because the metaphor contains a serious inconsistency.

In both hypertext and Borges's story, the spatial image of the Garden of Forking Paths stands for something that is not literally spatial, but the similarity ends there. Relying on a metaphorical process fundamental to human cognition, Borges invokes the spatial image of the forking paths to describe a fundamentally *temporal* phenomenon.⁸ In possible worlds theory, this phenomenon

would be described as the splitting of a world into parallel worlds with different destinies (and therefore, histories) every time this world is faced with the possibility of a change of state. If time is finely divided, this splitting of worlds and time occurs continually, since accidental interruptions of current processes can happen at every moment in a world's existence.⁹ Most of these splittings have no impact on our personal fate, but sometimes we reach decision points in life that affect our long-term destinies. The forks in time that matter existentially to us are the subject matter of narrative. But even when lifestories take one of the forks, relegating the other(s) to the domain of the counterfactual, the experiencer or interpreter cannot forget the paths not taken, because the significance of the actualized events is relative to their alternatives. The consideration of the could-have-been is an integral part of narrative comprehension.

In his spatial metaphor of time, however, Borges forgets that once worlds and their histories have taken diverging courses, they cannot come together again.¹⁰ When you arrive at my house, you can be my friend or my enemy, but this does not create a merging of destiny lines, because the field of future possibilities depends on our relationship, which itself depends on past events. If you are my friend you can expect to receive food and shelter, but if you are my enemy you should be prepared for a far worse treatment. If you receive food and shelter from somebody who is your enemy, this is a significantly different event than being treated in the same way by somebody who is your friend. Models based on the concept of possible worlds explain this situation through the concept of counterpart relation: you do not arrive at the same house in the same world through different temporal paths, but rather, you reach different houses in different worlds that occupy corresponding spatial coordinates within their respective world. It is only in physical space that you can reach the same location via different routes. If the splitting of worlds and time is irreversible, the graphic representation (the map) of the forking paths of life is not a network with loops, as are most hypertext maps, but an arborescent diagram whose branches never intersect with other branches and do not allow circuits. A literal rendition of Borges's vision would therefore only be possible in a fiction based on a tree.

While the space of Borges's garden is a metaphor of time, the space of Storyspace is a metaphor for the organization of the signi-

fieds. The maps represent the geography, and even less the temporal world brought to mind by the story. Hypertext is therefore nothing more than a map of the text map, which itself is a network of links and nodes that is not a physical geography is designed to be clicked and dragged without altering the system of relations. In other words, making the map represents.¹¹ In a map of physical space would be unthinkable: moving would result in a blatant inaccuracy. The maps is purely virtual, because the memory as a one-dimensional space is nothing inherently spatial about it. Turing has demonstrated, all com-

On a map of accessibility relations described by Borges would be represented by "splitting into 'x and y become enemies.'" Both of these lexia would "x arrives at y's house." To maintain should prevent the reader who reaches path "x and y become enemies" to and offers food and shelter." The guard field: only those readers who "friends" can be directed toward line that the reader later on travel an event that the text should allow possibilities. Narrative logic would the original guard field and its relations which would direct the reader toward Storyspace does not allow the different guard fields during reading. More works when used sparingly, because of previously visited nodes, a rather primitive semantic description of the fictional world for Storyspace authors to handle the relations between nodes, especially since

ing of a world into parallel worlds (and therefore, histories) every time this possibility of a change of state. If time is split into worlds and time occurs continually, then all possible current processes can happen simultaneously.⁹ Most of these splittings are of fate, but sometimes we reach decisions that alter long-term destinies. The forks in the road are the subject matter of narrative. We make one of the forks, relegating the other to the counterfactual, the experimenter or the observer, not taken, because the significance is relative to their alternatives. The past has been an integral part of narra-

time, however, Borges forgets that when paths have taken diverging courses, they do not merge. When you arrive at my house, you are there, but this does not create a merging of worlds. The set of future possibilities depends on the set of past events. If you are offered food and shelter, but if you are not prepared for a far worse treatment. You come from somebody who is your enemy, rather than being treated in the same way by a friend. Models based on the concept of branching this situation through the concept of time do not arrive at the same house in the same temporal paths, but rather, you reach worlds that occupy corresponding spatial positions in a separate world. It is only in physical space that one can reach the same location via different routes. If time is irreversible, the graphic representation of paths of life is not a network with multiple paths, but an arborescent diagram with many branches and do not merge. A model of Borges's vision would therefore be based on a tree.

A garden is a metaphor of time, the organization of the signi-

fied. The maps represent the arrangement of lexia, not the geography, and even less the temporal development of the fictional world brought to mind by the signifiers. The vaunted spatiality of hypertext is therefore nothing more than the two-dimensionality of the text map, which itself is the graphic representation of the network of links and nodes that underlies the text. That this space is not a physical geography is demonstrated by the fact that readers can click and drag the nodes to other locations on the screen without altering the system of relations that connects them—without, in other words, making the map less faithful to that which it represents.¹¹ In a map of physical space, by contrast, this operation would be unthinkable: moving London south of Paris would result in a blatant inaccuracy. The space represented on Storyspace maps is purely virtual, because the text itself is stored in computer memory as a one-dimensional string of zeroes and ones. There is nothing inherently spatial about computer organization: as Alan Turing has demonstrated, all computers can be simulated by a machine that reads an infinitely long tape.

On a map of accessibility relations between lexia, the situation described by Borges would be represented by a root node, "x meets y" splitting into "x and y become friends" and "x and y become enemies." Both of these lexia would then contain a link leading to "x arrives at y's house." To maintain narrative consistency, the text should prevent the reader who reaches the house-lexia from the path "x and y become enemies" to move on to "y greets x warmly and offers food and shelter." This could be done by means of a guard field: only those readers who have traversed "x and y become friends" can be directed toward "y greets x warmly." But imagine that the reader later on traverses "x and y become enemies," an event that the text should allow if it is to represent multiple possibilities. Narrative logic would then require the removal of the original guard field and its replacement with a new condition, which would direct the reader toward "y slams the door on x." But Storyspace does not allow the dynamic adding and removing of guard fields during reading. Moreover, the guard field option only works when used sparingly, because the device is based on previously visited nodes, a rather primitive condition, and not on the semantic description of the fictional world. It would be very difficult for Storyspace authors to handle a complex system of dependencies between nodes, especially since the system-generated maps do

not show the guard fields. This is why the metaphor of the jigsaw puzzle is a less utopian description of the cognitive processing of hypertext than the idea of a recombinant text whose elements tell a different story with every reading. In the jigsaw puzzle model, the connections between lexia need not represent a logical and temporal order, because the reader can rearrange them mentally into a (more or less) coherent picture. The plot (or plot-versions) is an image that the reader constructs by traveling through the virtual space of the text, collecting narrative fragments at every stop, and trying to assemble these fragments into a meaningful pattern. The main difference between puzzles and Storyspace hypertext lies in the fact that, faithful to postmodern aesthetics, hypertexts may prevent the formation of a complete picture, or they may lead to the construction of many conflicting partial images.

How then can one put the combinatorial features of Storyspace, a program that does not build a world model, in the service of narrative meaning? Since the author cannot control what the reader knows and does not know at every moment of the reading experience, narrative effects that depend on the calculated disclosure of information are incompatible with the medium. We shouldn't expect thrillers, suspense stories, dramatic curves of rising and falling tension, nor immersion in the flux of time in hypertext fiction. Thinking with the medium means in this case finding other functions for links than progressing in narrative time or moving around in the fictional world, though these functions cannot be entirely discarded if the text is to preserve some degree of narrativity. What are the alternatives?

Combine different linking logics. Allow the reader to follow a story chronologically, at least for a while, through linear stretches of lexia with obvious continuation links, but make these stretches intersect at certain points with other storylines, so that the reader can switch from one narrative possibility to another. Within each of these linear sequences, offer links that jump laterally to other lexia on the basis of nonchronological relations such as thematic analogies, expansion of an idea, metatextual comments, or different narrating voices offering alternative versions of the same events. Variations on this approach are found in *Victory Garden* (Stuart Moulthrop), *Patchwork Girl* (Shelley Jackson), and *Califia* (M. D. Coverley).¹² All these texts comprise sequences that move a story forward in time, but they surround these sequences with

links to other parts of the story to nonnarrative materials.

Work with "little stories" In the same way, for example, *True North*, by Stephanie Klein, consists of many fully autonomous poems, some of which show a linear development by two nineteenth-century poets, Emily Dickinson and Walt Whitman. Through allusions to each other, the poems achieve some coherence. The poems are also arranged by links and categorized into thematic groups that form broader narratives. Another example of this approach is *Deer* by David Byrne, described in chapter 5.

Present the text as a simulation of a process. *Present the text as a simulation of a process.* *memory, stream of consciousness, or a simulation of external events.* The links will represent processes that bring images, ideas, feelings, to the mind, and the succession of lexia will represent life, rather than the actual chronological sequence. The thoughts of the cognizing subject will move to an already visited lexia will not represent time, nor as a return to a certain point, nor the recurrence of a certain thought. The content, they will stand for contradiction rather than for contradiction with itself. This approach is best illustrated by two texts: *Blue* and *afternoon*.

Thinking with the medium means in this case giving meaning to the reader's activity. The meaning derives from the player's identification with the tasks to be fulfilled in order to achieve certain goods for the avatar, defending against the stealing cars. But in hypertext, as in the involvement in the fictional world, the significance of her activity cannot be that of an individuated member of the world. The puzzle cannot be metafictional rather than fictional. The puzzle cannot provide a satisfactory involvement, because it does not address particular themes of the text. Any puzzle is sold as a puzzle. From a literary point of view,

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links to other parts of the story, to other narrative possibilities, or
to nonnarrative materials.

Work with "little stories" that fit within one screen. For in-
stance, *True North*, by Stephanie Strickland, is a collection of large-
ly autonomous poems, some of which evoke projects in language
development by two nineteenth-century figures, Willard Gibbs and
Emily Dickinson. Through allusions to these figures (as well as to
others), the poems achieve some degree of micronarrativity. Lexias
are also arranged by links and color-coded words into cycles or the-
matic groups that form broader figures on the macrolevel. Another
example of this approach is Deena Larsen's *Marble Springs*, a text
described in chapter 5.

*Present the text as a simulation of mental activity—dreams,
memory, stream of consciousness—rather than as a representation
of external events.* The links will then stand for the associative pro-
cesses that bring images, ideas, and recollections to the conscious
mind, and the succession of lexia will represent the flow of inner
life, rather than the actual chronology of the events that occupy
the thoughts of the cognizing subject. In this model, looping back
to an already visited lexia will not be interpreted as flashbacks in
time, nor as a return to a certain location, but as the obsessive
recurrence of a certain thought. As for lexia with contradictory
content, they will stand for conflicting interpretations of events,
rather than for contradiction within the fictional world itself. This
approach is best illustrated by two works by Michael Joyce, *Twelve
Blue* and *afternoon*.

Thinking with the medium in hypertext also means giving
meaning to the reader's activity. In computer games, this meaning
derives from the player's identification with the avatar and from
the tasks to be fulfilled in order to win: tasks such as acquiring
goods for the avatar, defending the earth against evil aliens, or
stealing cars. But in hypertext, as I argue in chapter 5, the reader's
involvement in the fictional world is external and observatory, and
the significance of her activity cannot come from playing the role
of an individuated member of the fictional world. It must therefore
be metafictional rather than fictional. The metaphor of the jigsaw
puzzle cannot provide a satisfactory interpretation of the reader's
involvement, because it does not take into consideration the par-
ticular themes of the text. Any picture can be cut up, boxed, and
sold as a puzzle. From a literary point of view, the best hypertexts

are those that manage to present the reader's activity of moving through the network and reassembling the narrative as a symbolic gesture specific to the text, a gesture whose interpretation cannot be predicted by reading the medium as a built-in message, as McLuhan's famous formula¹³ advocates. Here are two examples of hypertexts that, in my view, successfully customize the significance of the reader's activity.

The short story *Twelve Blue* by Michael Joyce contains several narrative subworlds, each inhabited by different characters but connected by common themes. (Foremost among them is the theme of drowning.) An interface of colorful threads, which suggests destiny lines, dangles the promise of stories. By clicking on a thread of a given color the reader is able to follow the life of a certain character for a limited time, but the thread eventually decays, and the reader is switched to a different plotline, as if memory had failed, or as if the synapses of the brain had suddenly fired in another direction. The whole process resembles stream of consciousness, except that the stream runs through the minds and private worlds of many characters. The random activity of clicking and bringing text to the screen thus mimics the mysterious functioning of memory, the fluidity of dream, and the operation of a collective consciousness. But it is only because the colored threads can keep us for a while in the world of the same individual that we become familiar with the inner and outer lives of characters and learn to care for them. Joyce has successfully streamlined navigational choices to enhance narrative interest.

In Shelley Jackson's *Patchwork Girl*, the reader's clicking symbolizes the activity of sewing a crazy quilt from different pieces of material cut out from old garments. The quilting theme allegorizes the postmodern practice of constructing a text out of disparate elements, including recycled quotes. Faithful to this practice, *Patchwork Girl* abounds in intertextual allusions and includes both narrative fragments and theoretical considerations on the nature of its medium. But the reader's symbolic stitching also simulates the activity of two female figures: the heroine, Mary Shelley (a fictional counterpart of the author of *Frankenstein*), who assembles a female monster by sewing together body parts collected from different women; and the author, Shelley Jackson, who constructs a narrative identity for the monster from the lifestories of these women.

Patchwork Girl is one of the last major hypertexts written with

Storyspace, and its general design of complex labyrinths for which the reader is responsible. The text is divided into sections that radiate like the spokes of a wheel from a central "yard" (containing the stories of the "original" (Mary's diary), a "quilt" of the hypertextual reading experience of subjectivity), a "story" (the "original" and "broken accents" (more of the text). The general linking system consists of two links leading out of each section, for instance, either fill a single link or provided the monster's body parts. The linear linking structure that emerges from the story, rather than having a scrambled elements. In a gesture of strategy belies the thematics of the text. In contrast to the endlessness of *Garden*, the reader develops a sense of the end of the stories. Though the stories are occasionally interwoven, the differences make it easy to identify the major constituents of the text. The hidden tricks in the linking strategy allows for the type of goal-oriented well-designed Internet Web sites. The labyrinth so prominent in early hypertexts. *Girl* looks toward a narrative structure of an open archive.¹⁴

present the reader's activity of moving and assembling the narrative as a symbolic gesture whose interpretation can be read in the medium as a built-in message, as an advocate. Here are two examples of how to successfully customize the significance

ue by Michael Joyce contains several threads inhabited by different characters but conjoined by a common theme. Foremost among them is the theme of colorful threads, which suggests destiny and stories. By clicking on a thread of a story to follow the life of a certain character, the thread eventually decays, and the reader's timeline, as if memory had failed, or as if it had suddenly fired in another direction, leads to a new stream of consciousness, except for the minds and private worlds of many characters. The activity of clicking and bringing text to the surface, like the mysterious functioning of memory, the operation of a collective consciousness. Colored threads can keep us for a while in a virtual world that we become familiar with characters and learn to care for them. The limited navigational choices to enhance

Patchwork Girl, the reader's clicking symbolizes a crazy quilt from different pieces of garments. The quilting theme allegorizes the process of constructing a text out of disparate quotes. Faithful to this practice, the hypertextual allusions and includes both theoretical considerations on the nature of hypertext. Symbolic stitching also simulates the work of the heroine, Mary Shelley (a fictional character in *Frankenstein*), who assembles a female body parts collected from different sources. Mary Jackson, who constructs a narrative of the lifestories of these women.

The last major hypertexts written with

Storyspace, and its general design hints at a departure from the complex labyrinths for which the Storyspace toolbox was conceived. The text is divided into semiautonomous components that irradiate like the spokes of a wheel from a central page: a "graveyard" (containing the stories of the monster's body parts), a "journal" (Mary's diary), a "quilt" (made of theoretical reflections on the hypertextual reading experience and its putative configuration of subjectivity), a "story" (the monster's life after leaving Mary), and "broken accents" (more observations on the writing process). The general linking system is rather economical, with one or two links leading out of most nodes. The narrative episodes, for instance, either fill a single lexia (the stories of the women who provided the monster's body parts), or they offer a simple, almost linear linking structure that enables the reader to catch the flow of the story, rather than having to assemble the storyworld from scrambled elements. In a gesture of user-friendliness, this linking strategy belies the thematics of dismembering that permeate the text. In contrast to the endless looping of *afternoon* or *Victory Garden*, the reader develops a good sense of having reached the end of the stories. Though the voices of Mary and of the monster are occasionally interwoven, differences in typographical presentation make it easy to identify the speaker. The clear separation of the major constituents of the text, as well as the absence of hidden tricks in the linking strategy—no use is made of guard fields—allows for the type of goal-oriented navigation that we find in well-designed Internet Web sites. Abandoning the metaphor of the labyrinth so prominent in early Storyspace hypertexts, *Patchwork Girl* looks toward a narrative structure that will flourish under a new generation of computers systems and authoring programs: the structure of an open archive.¹⁴

7. Web-Based Narrative, Multimedia, and Interactive Drama

In the early to mid-1990s, computer systems underwent two developments that deeply affected digital textuality: the ability to encode and transmit visual and aural data efficiently; and the ability to connect personal computers into a world-spanning network. The textual consequences of these new features are publicly posted on millions of Internet pages. Though Web pages implement the same hypertextual architecture as Storyspace fiction, they differ significantly from the latter in their linking philosophy and graphic appearance. From a visual point of view, the major design characteristic of Web pages is what Bolter and Grusin have called their "hypermediated structure": the division of the screen into separate areas, or windows, containing different types of data. As a multimedia text, a Web page is not constructed through a single authoring program but assembled from elements generated by a variety of sources: word processors, drawing programs, photo-manipulation programs, sound-manipulation programs, and animation software. The majority of Web pages have an informational function to fulfill, and in contrast to experimental literature, they make it a positive value to be easy to search. This goal translates into a linking strategy that enables the reader to make informed choices of destination rather than clicking blindly on hidden links or mysterious words. The typical structure of a Web site is not a maze that exposes visitors to running in circles, but a sea-anemone (Figure 2c), or radiating structure, that connects every page to the center, so that the visitor can always return

in one click to the home page, no matter how far they travel along the arms.

Archival Narratives

When it is put in the service of a database, the radiating structure facilitates the dynamic linking of narrative texts do more than chronicle events; they also provide background information about the characters in a concrete environment. As they move through the story, characters, they also pick up the descriptions of the environment together with their spatial surroundings. They can branch into other stories, which may be related to the main story. All narratives must eventually link back to the beginning at some time, though some authors—Dorothy Sayers—do not do so, it rather reluctantly. With a digital narrative, the linking of the spatial and temporal growth of the story has to be made by the author. It is the author's responsibility to want to follow trails into new narrative spaces.

Lev Manovich has argued that narrative is a "database of real enemies" because narrative projects a linear path, a trajectory, while a database, particularly a digital one, presents the world as a list of items, and it refuses to follow a linear path. Yet if the database is properly structured, the unpredictable path of the reader will not prevent the narrative from being. The reconciliation of database and narrative requires the following conditions are met:

1. A storyline with which readers can follow the global coherence of the story is provided, like a magnifying glass to center the reader on the whole plot.
2. A very modular narrative, where each module serves more or less autonomously.
3. A narrative that foregrounds the reader's position in the world in which the story takes place, so that the reader to the reader as following the narrative.
4. A database design and a linking strategy that is transparent to enable readers to aim at the end of the story that they want to reach.

in one click to the home page, no matter how far she has wandered along the arms.

Archival Narratives

When it is put in the service of narrative meaning, the radiating structure facilitates the dynamic unfolding of storyworlds. Narrative texts do more than chronicle actions and events; they also provide background information that situates these events within a concrete environment. As they follow the life of the main characters, they also pick up the destinies of the secondary characters, together with their spatial surroundings. These lifestories may branch into other stories, which lead into yet other environments. All narratives must eventually limit this accumulation of space and time, though some authors—Dostoevsky and Laurence Sterne—do it rather reluctantly. With a digital database, the decision to stop the spatial and temporal growth of a textual world no longer needs to be made by the author. It is the reader who decides how far she wants to follow trails into new narrative territories.

Lev Manovich has argued that “narrative and database are natural enemies” because narrative presupposes a cause-and-effect trajectory, while a database, particularly a digital one, “represents the world as a list of items, and it refuses to order this list” (2001, 225). Yet if the database is properly structured, and if its contents are appropriate, the unpredictable probes and always incomplete exploration of the reader will not prevent the emergence of narrative meaning. The reconciliation of database and narrative is facilitated when the following conditions are met:

1. A storyline with which readers are already familiar. When the global coherence of the story is not problematic, readers can bring a magnifying glass to certain parts without losing sight of the whole plot.
2. A very modular narrative, whose individual parts are themselves more or less autonomous stories.
3. A narrative that foregrounds the setting, so that learning about the world in which the story takes place is at least as important to the reader as following the narrative events proper.
4. A database design and a linking philosophy sufficiently transparent to enable readers to aim with precision at the elements of the story that they want to expand.

Based Narrative, media, and Interactive

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computer systems underwent two detected digital textuality: the ability to and aural data efficiently; and the computers into a world-spanning network of these new features are publicly net pages. Though Web pages implement architecture as Storyspace fiction, the latter in their linking philosophy from a visual point of view, the major pages is what Bolter and Grusin have structure”: the division of the screen dows, containing different types of Web page is not constructed through but assembled from elements generated by word processors, drawing programs, animation, sound-manipulation programs, and the majority of Web pages have an in-fill, and in contrast to experimental value to be easy to search. This strategy that enables the reader to destination rather than clicking blindly us words. The typical structure of a exposes visitors to running in circles, 2c), or radiating structure, that connects, so that the visitor can always return

As an example of a narrative database that meets these conditions, consider the huge online archive devoted to the Lewis and Clark expedition, *Discovering Lewis and Clark*. The Web site develops the story—and the world—of Lewis and Clark to truly encyclopedic dimensions. For instance: we read in the diary of Lewis and Clark that music was often performed in the evening by a fiddler named Pierre Cruzatte. A link takes us to a page that tells everything known about Cruzatte. We can even see a movie clip of a Cruzatte impersonator performing popular tunes of the time. Or we may click on the fiddle and get the history of the violin. From there we can go to a page on Thomas Jefferson as a violinist, where we learn that he owned a bow by François Tourte, a master bow-maker of the time. This in turn leads to a lecture on bow design that describes the innovation introduced by Tourte. Readers who do not care about music may branch instead toward Indian tribes of the Northwest; toward early-nineteenth-century cartography; or toward food on the expedition. Since this is a Web site, new materials are posted every month. With its documentary subject matter and practical design, the Lewis and Clark archive makes no claim to offering an “artistic” navigational experience. Yet there is no reason why a text with literary ambitions and a new story to tell could not be structured as a user-friendly archive with reasonably accessible documents.

A step in this direction is M. D. Coverley's heavily multimedia hypertext *Califa* (2000), a text written with the SuperCard program of the Macintosh operating system and sold by Eastgate Systems (Figure 7).

A visual delight—each page combines text boxes, pictures, and iconic buttons into stunning collages—*Califa* abandons the “Garden of Forking Paths” metaphor that dominated the first generation of Storyspace hypertexts in favor of a simpler navigational design: go North, then East, then South, then West. Each of the four stories (narrated by one of the three main characters, Augusta) can be followed linearly, and the itinerary actually leads to an end, a rare occurrence in hypertext. But the reader can always switch along the way to the “trails” of the other two protagonists: Kaye, who gathers star charts, Indian lore, and other spiritual guides; and Calvin, who maintains an archive of documents about California and family history: diaries, letters, photos, and topographical maps. The text chronicles a treasure hunt, and though



Figure 7. Screen shots from M. D. Coverley's *Califa*, developed by Eastgate Systems Inc. <http://www.eastgate.com>

the treasure-seekers are the main characters, the success of the search depends on the documents in the archive. As Rainey, the treasure-seekers are in a sense put to an equal position.

ve database that meets these conditions: an archive devoted to the Lewis and Clark expedition. The Web site delves—of Lewis and Clark to truly entrance: we read in the diary of Lewis performed in the evening by a fiddle. A link takes us to a page that tells us more. We can even see a movie clip of a violinist performing popular tunes of the time. Or we can get the history of the violin. From there, we can go to a lecture on bow design by Thomas Jefferson as a violinist, where we are introduced by François Tourte, a master bowmaker. This leads to a lecture on bow design introduced by Tourte. Readers who branch instead toward Indian tribes or nineteenth-century cartography; or ... Since this is a Web site, new material can be added. With its documentary subject matter, the Lewis and Clark archive makes no claim to be a virtual experience. Yet there is no doubt about its ambitions and a new story to tell. It is a user-friendly archive with reasonably

A. D. Coverley's heavily multimedia text written with the SuperCard programming system and sold by Eastgate

Systems. The game combines text boxes, pictures, and interactive collages—*Calafia* abandons the metaphor that dominated the first version in favor of a simpler navigation system. East, then South, then West. Each journey is led by one of the three main characters: Rains, the explorer, early, and the itinerary actually leads to a new page of hypertext. But the reader can always "branch off" of the other two protagonists: Rains, Indian lore, and other spiritual traditions. It contains an archive of documents about the expedition: diaries, letters, photos, and topographical maps. It is a treasure hunt, and though

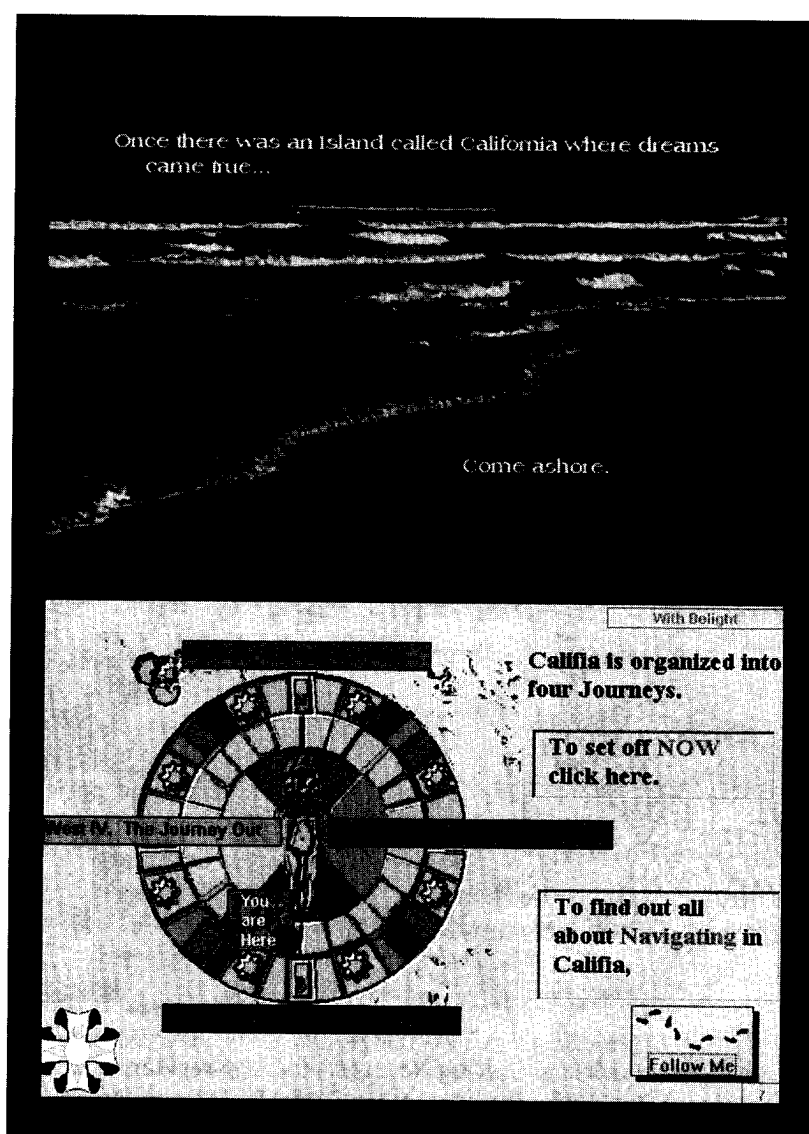


Figure 7. Screen shots from M. D. Coverley's *Calafia*. Reproduced with permission of Eastgate Systems Inc. <http://www.eastgate.com>.

the treasure-seekers are the main characters, the reader feels that the success of the search depends on her ability to decipher the documents in the archive. As Raine Koskimaa writes: "We readers are in a sense put to an equal position with the fictional characters,

as users of the same archival program they are using" (2000, 135). *Califia* is actually a fake game, not only because the treasure is never found but mainly because the reader can reach the end without solving any problems, not even running a maze. But the sense that the success of the enterprise depends on connecting the present to the past motivates the reader to explore the database. The encyclopedic information provided by the text may seem at times as tangential to the quest as bow design to the Lewis and Clark expedition, but by unearthing the rich cultural heritage that lays buried under the freeways and parking lots of Southern California the reader eventually gains a sense of place—the true treasure of Califia. At the end of the trip west, as the heroes stand at the edge of the ocean with nowhere to go, they understand that their quest has not been in vain: "*Granted we did not find the riches of which we had been told, we found a place in which to search for them.*" The riches are found by simply connecting with the land.

Early Web-Based Narrative: HTML Frames

The development of the Internet had another consequence for electronic literature. While early works were sold as diskettes or CD-ROMs by Eastgate, the current generation of digital fiction or poetry is primarily distributed for free on the World Wide Web. Since downloading is still slow, and people have limited patience with reading on a screen, this encouraged the creation of short texts meant to be read in one session. One of the landmarks in the transition from classical hypertext fiction to Web-based forms of literature is a text written with the Frames feature of the HTML mark-up language, *My Boyfriend Came Back from the War* by the Russian author Olia Lialina (Figure 8). This text, which dates back to 1996, has achieved cult status on the Web and inspired multiple adaptations in other authoring systems,¹ thereby serving as anchor in a new form of textuality that Katherine Hayles calls “the work as assemblage”: a “cluster of related texts that quote, comment upon, amplify and remediate each other,” “cycling through diverse [sub] media in exuberant and playful performances” (2003, 277, 280). Yet if the various adaptations illustrate the diverse resources of their supporting systems, none of them achieves the simple yet powerful eloquence of the original.

For the reader who likes to explore a text systematically, one of the most frustrating aspects of the densely connected networks

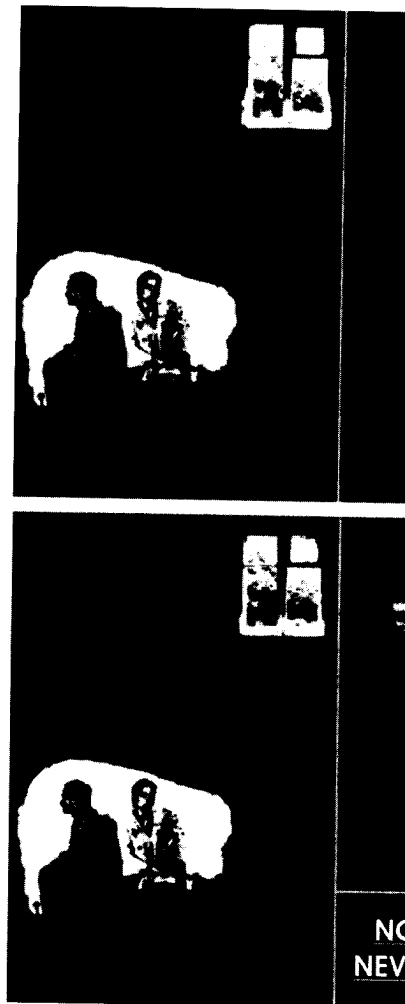


Figure 8. Screen shots from Olia Lialina's presentation, slightly modified to enhance readability.

of classical Storyspace hypertext. The reader can follow several routes simultaneously, or to return to any of these routes. Once the reader selects a new route on the same page, he can only explore that route. The reader can never curve back toward the intersection point. The reader will present themselves in the middle of the route and will not return to the decision point from which the route

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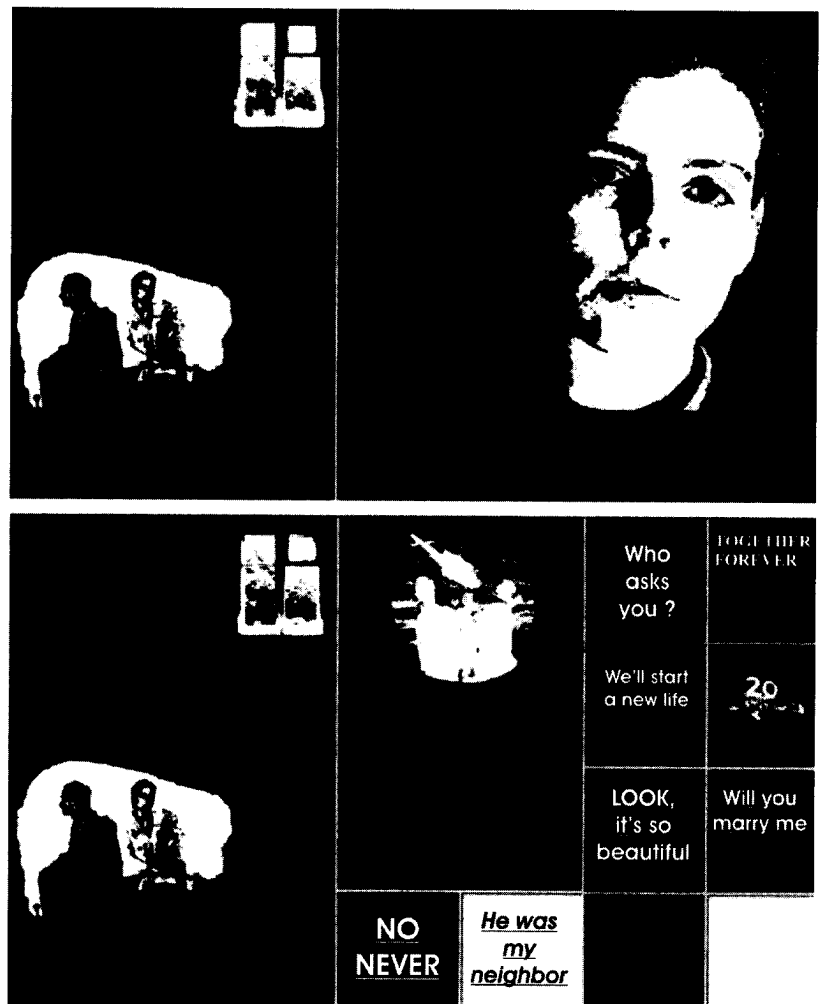


Figure 8. Screen shots from Olia Lialina's *My Boyfriend Came Back from the War*, slightly modified to enhance readability of text. Reproduced with permission.

of classical Storyspace hypertext is the difficulty to follow several routes simultaneously, or to move back and forth between these routes. Once the reader selects one of many links out of the same page, he can only explore the other alternatives if the path curves back toward the intersection; but since many other choices will present themselves in the meantime, there is no reliable way to return to the decision point from within the link system of the

text (that is, without using the alternative modes of navigation offered by the interface buttons).² In *My Boyfriend Came Back from the War*, Lialina proposes a clever solution to this problem—or rather a clever alternative to what is usually a deliberate design philosophy—by exploiting a feature of HTML which makes it possible to divide the screen into separate areas, or frames. In contrast to Storyspace windows, which correspond to distinct pages and partially hide each other when several of them are opened simultaneously, HTML frames are subdivisions within the same page, and their entire content is visible all the time, thereby affording the reader a panoramic view of the text. Frames can be manipulated and explored individually by the user, and they can be nested within other frames, though the fixed size of the screen sets limits on how many frames can be efficiently used at once.³

The text begins with a unified screen displaying the phrase “My boyfriend came back from the war; after dinner they left us alone.” The first click divides the screen into a pair of windows showing, respectively, two dejected people looking in opposite directions and the self-referential image of a window frame, which suggests that the lovers, far from being left alone, are placed under surveillance by the reader and the family. The next click further splits one of these windows in two, and so on until the screen is partitioned into seventeen distinct spaces ($1 + 16$) that contain either text or a black-and-white still picture whose lack of gray tones suggests the binarism of stereotyped gender roles (male vs. female) and of the discourse of war (us vs. them, good vs. evil). When the reader reaches this bottom level, text replaces itself in each window, telling a linear story through a broken dialogue. When a window has been exhausted, it turns black, telling the reader that its narrative thread has come to an end. Reading the text thus becomes a game of creating as many frames as possible and then erasing the white marks of their content. While the reader explores a window, the others remain visible on the screen, offering alternative stories, and the reader can always switch from one window to another by clicking on another frame. This feature makes the use of an external text map superfluous; or rather, the text functions as its own map, showing at any given time which frames hold content to be explored, and which ones have been exhausted. By clicking on the frames, the reader “digs” deeper into them, leaving the other frames in their current state. The exploration of the text thus represents a

vertical activity of unearthing hypertext, where clicking on a node and to another area of the text is an endless journey that allows the reader to revisit visited places, the vertical exploration reaching bottom.

From a thematic point of view, the text suggests the multiple possibilities of a relationship. His girlfriend after a long separation. The screen also symbolizes the distance between the lovers, and the journey apart of the lovers, and the place in most scenarios. Only the note: “Together forever”; or “I love you” but they are the shortest, and the wishful thinking. Other scenarios: “My girlfriend when asked to set a date for me?”; “TOMORROW”; “No, because the weather must be better. Yes, my girlfriend being questioned by her family about his absence (“You don’t trust me. Last summer . . . And if you trust me, Don’t you see”), or the boyfriend’s lame excuse and a vacuous promise (“I’ll help you”).

Told in a halting, minimalist style, filled in by the reader (let’s not forget by a Russian speaker), *My Boyfriend Came Back from the War* powerfully captures the emotional dimension that fails to deliver the happiness of the romance. Through a story tailored to the size of the screen, to the idea of multiple narrative, a combination of human interest and the affordances of its supporting software is a powerful demonstration of what it means.

Approaching *My Boyfriend Came Back from the War*, Lev Manovich comments: “The diachronic dimension is no longer privileged over the synchronic dimension, time is no longer privileged over simultaneity.”

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² In *My Boyfriend Came Back from*
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vertical activity of unearthing content, in contrast to Storyspace
 hypertext, where clicking on links is a lateral sliding to another
 node and to another area of the map. Whereas lateral movement is
 an endless journey that allows travelers to loop back to previously
 visited places, the vertical exploration of *My Boyfriend* eventually
 reaches bottom.

From a thematic point of view, the splitting of windows sug-
 gests the multiple possibilities that arise when a soldier returns to
 his girlfriend after a long separation, but the successive divisions of
 the screen also symbolize the division that war involves, the grow-
 ing apart of the lovers, and the failure to communicate that takes
 place in most scenarios. Only two of the threads end on a positive
 note: “Together forever”; or “Look, it’s so beautiful” / “kiss me”;
 but they are the shortest, and they may represent no more than
 wishful thinking. Other scenarios show the stalling of the boy-
 friend when asked to set a date for the wedding (“Will you marry
 me?”; “TOMORROW”; “No, better next month after holidays and
 the weather must be better. Yes next month. I’m happy now.”), the
 girlfriend being questioned by her lover about her faithfulness dur-
 ing his absence (“You don’t trust me, I see”; “But it was only one.
 Last summer . . . And if you think . . . Why should I explain? . . .
 Don’t you see”), or the boyfriend sheepishly breaking up with a
 lame excuse and a vacuous promise (“All guys change; don’t worry;
 I’ll help you”).

Told in a halting, minimalist dialogue that leaves large gaps to be
 filled in by the reader (let’s not forget that it was written in English
 by a Russian speaker), *My Boyfriend Came Back from the War*
 powerfully captures the emotional drama of a long-awaited mo-
 ment that fails to deliver the happy ending required by the conven-
 tions of the romance. Through its choice of a simple yet poignant
 story tailored to the size of the screen, its efficient visual interface
 to the idea of multiple narrative possibilities, and its all too rare
 combination of human interest and creative exploitation of the af-
 fordances of its supporting software, Lialina’s text proposes a pow-
 erful demonstration of what it means to think with the medium.

Approaching *My Boyfriend* from the perspective of the cinema,
 Lev Manovich comments: “The result is a new cinema in which the
 diachronic dimension is no longer privileged over the synchronic
 dimension, time is no longer privileged over space, sequence is no
 longer privileged over simultaneity, montage in time is no longer

privileged over montage within a shot" (2001, 326). But why should the point of reference for the originality of this work come from the cinema? We could just as well regard Lialina's text as a remediation of print; then we will be sensitive to what Manovich calls montage in time, namely, the dynamics of frame replacement as the reader clicks on various parts of the screen. Or better, we could read *My Boyfriend* in the context of narrative Renaissance paintings. As Wendy Steiner has shown, these paintings often partitioned their space with architectural or landscape features and represented different moments of a story in each of these frames. Though *My Boyfriend* resorts to the same technique of partition, it uses its medium to display evolving content within each frame, and rather than telling one story dispersed through many frames, it associates each frame with one of the narrative possibilities that branch out from a common situation.

Flash

The major influence on the form of today's digital works is the widespread adoption of a program named Flash produced by Macromedia that allows what is called the "streaming" of information: when the user downloads a Flash movie—as the products are called—from the Web, the movie can start playing on the user's screen before all the data have been downloaded. The label of "movie" that designates Flash products underscores the program's major difference from Storyspace: a shift in emphasis from spatial navigation to temporal dynamics. As a machine that executes instructions sequentially, regulated by the pulses of an internal clock, the computer has always operated in a temporal flow; but this flow can be easily stopped by the software. This is exactly what happened with Storyspace and the Infocom engine: the program performs a series of jumps to specific addresses, displays their contents on the screen, and waits for user input before taking another jump and displaying the content of other addresses. In Flash and other programs of its generation, time is liberated, and the screen can rewrite itself without user action.⁴ Many Flash texts play indeed like movies, foregoing interactivity. These texts use the medium primarily for the convenience of building animated multimedia displays and for making themselves widely available over the Internet.⁵

The forward movement of the movies allows animation effects, but the designer can control the flow of time, for instance, by mak-

ing the movie stop on certain frames or by looping back to a previous one. A Flash movie imposes its tempo on the user, who must determine how much time she spends on each frame. This possibility to alternate between different sequences of books and the forward movement of the text, what makes interactive digital media truly unique among media.

The emphasis of the program on temporal dynamics mean that Flash products neglect the spatial dimension of a two-dimensional display, called the *stage*, as opposed to the temporal one, the *timeline*. But spatial navigation, the *visual space* of the stage, rather than the temporal one of the fictional world, as it does in IF, is the primary mode of the text, as it does in Storyspace. A Flash movie by placing various objects on the stage and scripted behaviors to these objects, it defines the sequences of frames on the timeline, and the objects associated with them appear and disappear like script like actors on the stage.

A program of superior multimedia allows the user to interact with a wide variety of objects: text, images, sound files, vector graphics (for pictures generated by the program), sound files. Some of these objects are clickable: when the user clicks on them, or simply moves the mouse over them, an action that modifies the display is triggered. This action is programmed by programming the system to execute a certain action on the timeline and to display the content of a certain frame. It may seem that Flash relies on a purely linear protocol, but the way it organizes the objects along the timeline is similar to the way it organizes the objects on the level of machine-language. However, Flash does not generate a large number of links. Since it is left to the author to define the links, when the user activates a certain object, the network of Flash movies tend to be more linear than Storyspace hypertexts.

An important feature of Flash is that the display does not consist of a single image. The way the objects are superposition creates an impres-

a shot" (2001, 326). But why the originality of this work come as well regard Lialina's text as a will be sensitive to what Manovich the dynamics of frame replacement parts of the screen. Or better, we context of narrative Renaissance shown, these paintings often par- tectural or landscape features and f a story in each of these frames. o the same technique of partition, olving content within each frame, e dispersed through many frames, of the narrative possibilities that tion.

on of today's digital works is the gram named Flash produced by called the "streaming" of infor- ads a Flash movie—as the prod- he movie can start playing on the ve been downloaded. The label of oducts underscores the program's : a shift in emphasis from spatial s. As a machine that executes in- by the pulses of an internal clock, d in a temporal flow; but this flow are. This is exactly what happened engine: the program performs a ses, displays their contents on the before taking another jump and ddresses. In Flash and other pro- erated, and the screen can rewrite Flash texts play indeed like mov- e texts use the medium primarily nimated multimedia displays and ilable over the Internet.⁵

movies allows animation effects, low of time, for instance, by mak-

ing the movie stop on certain frames until the user activates a but- ton or by looping back to a previous frame. Sometimes the Flash movie imposes its tempo on the user; sometimes the user is able to determine how much time she wants to spend on a certain frame. This possibility to alternate between the leisurely reading experi- ence of books and the forward movement of cinematic movies is what makes interactive digital texts, and Flash texts in particular, truly unique among media.

The emphasis of the program on temporal dynamics does not mean that Flash products neglect spatiality: the author works with a two-dimensional display, called the *stage*, as well as with a tem- poral one, the *timeline*. But space in Flash means primarily the *vi- sual space* of the stage, rather than the *topographical space* of a fictional world, as it does in IF games, or the *structural space* of the text, as it does in Storyspace hypertexts. The author creates a Flash movie by placing various objects on the stage, by attributing scripted behaviors to these objects, and by connecting them to se- quences of frames on the timeline. When the frames are played, the objects associated with them appear, disappear, and perform their script like actors on the stage.

A program of superior multimedia capabilities, Flash can handle a wide variety of objects: text, bitmaps (for imported pictures), vector graphics (for pictures generated within the program), and sound files. Some of these objects function as buttons: when the user clicks on them, or simply mouses over, the system performs an action that modifies the display. Hypertextual effects are created by programming the system to perform a "goto" another frame on the timeline and to display the text or the images linked to this frame. It may seem that Flash replaces the spatiality of Storyspace with a purely linear protocol, but its movement back and forth along the timeline is similar to the mode of operation of Storyspace on the level of machine-language instructions. Unlike Storyspace, however, Flash does not generate a spatial diagram of the system of links. Since it is left to the author to keep track of what happens when the user activates a certain button, the underlying transition networks of Flash movies tend to be much simpler than those of Storyspace hypertexts.

An important feature of Flash is its layered structure. The stage does not consist of a single image but of many graphic levels whose superposition creates an impression of depth. Since the layers of

this palimpsest are independent of each other, objects can move inside the foreground while the background remains stable. An object on a close layer can hide an object on a distant layer, or layers can be made invisible when certain conditions are met, thus revealing the contents of a deeper layer. One of the most productive effects of this lamination is the possibility of making images emerge from the depth of the digital palimpsest when the user mouses over certain "hot spots," which are themselves active objects hidden on the deepest layers. While visible action buttons make Flash movies interactive, hidden hot spots make them reactive, since they respond to involuntary user actions.

The programming language of Flash allows designers to associate objects with custom-designed behaviors and to diversify the actions triggered by the buttons. In Storyspace all the buttons were links, the only mode of activation was clicking, and all that clicking could do was display another lexia. In Flash buttons can make an object change color and shape, move around the screen, or be replaced by another object; they can stop the forward movement of the movie or, on the contrary, set it again in motion; and like Storyspace links, they can trigger jumps forward or backward along the timeline. These behaviors can also be made conditional on variables internal to the program, which means that they will be activated independently of user control. In contrast to IF systems, the programming language of Flash is generally not used to build a world model attributing lifelike properties to objects but to regulate their purely visual behavior. Whereas IF may contain code that says "if x is a lock pick, it can be used to open a door," Flash code will typically be made of statements such as "On mouse-enter (= when the cursor moves over an object), make the object disappear." Because of the programmability of the system, the author can control how fast the movie will play, how long images or text will remain visible, what transformation they will undergo, and how much time the user will have to perform a certain action. With Flash, timing becomes a new source of meaning.

It is difficult to predict where narrative is headed in the age of Flash. Most applications so far have been minigames, purely visual works, random combinations of sound, text, or picture fragments known as "remixes," "theoretical fictions" that privilege meta-textual comments at the expense of narration,⁶ concrete poetry, or visual adaptations of print poems. All we can say at the present time

is that Flash narratives, because of their complexity, are different from the complex labyrinths of Storyspace. Whether the complex labyrinths of Storyspace are the result of the requests of IF. In the narrative domain, Flash is different from traditional stories and postmodern stories. An example of a traditional story is the children's classic *Jack and the Beanstalk*. Flash animates the illustrations of the story. The narrative use is illustrated by Judy Finkelstein's *The Jew's Daughter*, a text-only work in which part of the text is hidden behind a visible mark when the mouse passes over it. The reader cannot tell what is new, and this makes it impossible to follow the story. The text is only readable on the movie screen. The instability of meaning, or perhaps the instability of the writing process—the recursive nature of the technique of cut-and-paste—is a feature of the technique of cut-and-paste.

Can Flash be used to produce interactive narratives? *The Jew's Daughter*—texts that are both readable and readable as stories? The beauty of Flash is a viable compromise between the traditional and the new. It comes from a form of poetry that has been on the sites devoted to Flash art as an interactive narrative, poetry, code poetry, and computer poetry. It dominates the scene of digital poetry. It is the relations between words and images that are the linear text evoking some aspect of the traditional active graphic illustration that is specific to Flash. Insofar as the text is not a story, neither discourse nor story, these are interactive narratives.

In Ingrid Ankerson's and Mark Sussman's *The Jew's Daughter* (Figure 9), the text is reduced to a single line, a frieze made of distinct pictures that move from left to right in a closed loop. On the movie screen, the text is aloud, and most readers will judge it to be interactive. (Actually, the reader can interact with the text, beginning, but the human voice cannot be heard. The reader can let her think about anything she wants. The reader can make the text and the movie screen shrink, move left or move right,

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background remains stable. An ob-
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is that Flash narratives, because of the length restriction, will be nei-
ther the complex labyrinths of Storyspace nor the time-consuming
quests of IF. In the narrative domain, Flash has been used for both
traditional stories and postmodern experiments in antinarration.
An example of a traditional story is *Arloz the Little Rhinoceros*, a
parody of the children's classic *Babar the Little Elephant*, in which
Flash animates the illustrations of a text that reads linearly. The anti-
narrative use is illustrated by Judd Morrissey's *The Jew's Daughter*,
a text-only work in which part of the screen replaces itself without
visible mark when the mouse passes over highlighted words, so that
the reader cannot tell what is new and what is old. Needless to say,
this makes it impossible to follow the development of a story. The
text is only readable on the metanarrative level, as an allegory of
the instability of meaning, or perhaps as a simulation of the dynam-
ics of the writing process—the replacement standing for corrections
and for the technique of cut-and-paste.

Can Flash be used to produce a middle ground between *Arloz*
and *The Jew's Daughter*—texts that are both formally innovative
and readable as stories? The best examples of works that achieve
a viable compromise between these somewhat conflicting goals
come from a form of poetry that is beginning to emerge on Web
sites devoted to Flash art as an alternative to the concrete (visual)
poetry, code poetry, and computer-generated texts that currently
dominate the scene of digital poetry. This new form explores the
relations between words and images by combining a short, often
linear text evoking some aspect of human experience with an inter-
active graphic illustration that puts into play the design resources
specific to Flash. Insofar as the reader's manipulations affect nei-
ther discourse nor story, these are interactive texts without being
interactive narratives.

In Ingrid Ankerson's and Megan Sapnar's poem "Cruising"
(Figure 9), the text is reduced to a line, and this line is integrated
into a frieze made of distinct pictorial frames that runs from left
to right in a closed loop. On the first iteration, the text is read
aloud, and most readers will just listen. Then the text becomes
interactive. (Actually, the reader can interact from the very be-
ginning, but the human voice captures too much of her attention
to let her think about anything else.) By moving the cursor, the
reader can make the text and its graphic background grow or
shrink, move left or move right, and move at different speeds. The



Figure 9. Screen shots from "Cruising," by Ingrid Ankerson and Megan Sapnar. Reproduced with permission.

goal is to get a combination of size, speed, and direction that allows the text to be deciphered; for most of the time, the letters are too small, and they move too fast for the eye to make out the words. The user's control of the speed and direction simulates the driving of a car; and indeed, driving a car is what the text is all about: "I remember cruising Main Street with Mary Jo and Joanie, the heat pumping full blast, windows down, night rolling through Mary Jo's father's station wagon like movie credits." The looping of the text mimics the repetitive aspect of the favorite activity of small-town teenagers: up and down, up and down the

same street, the only difference speed of the car and in the res framed by the car window. At and we can read their details, w like the frames on a strip of fil blend into each other to form a mechanism, the interface enable ly in the experience described i on the medium, it underscores t between text that we can read a before our eyes. What literary of form and content" has becom interface, theme, and image.

Whereas "Cruising" keeps a and programming virtuosity, r Jason Lewis, clearly tips the scal erary game, "Nine" (Figure 10) of the nine-tile puzzle. This puzzle from our childhood, consists of an empty space arranged in a 3 by 3 is to slide the tiles until a certain arranging the numbers 1 to 8 in a picture. Thanks to the volatility "Nine" adds a new dimension tile with multiple image fragments. As the player holds down the mouse images fade into each other in a player is therefore twofold: get all the same image; and then slide it. For inexperienced players, the solving the puzzle is not the point against its symbolism.

"Nine" creates a new twist on with a narrative. Every time the p story appears in the empty square square on the grid to every narrati the first fragment in the square le second fragment in the square va so on. This means that no matter he will read the text in the same



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same street, the only difference between two runs residing in the speed of the car and in the resulting legibility of the landscape framed by the car window. At low speed we see distinct images, and we can read their details, while at high speed the images look like the frames on a strip of film, except that the frames do not blend into each other to form a moving picture. As a simulative mechanism, the interface enables readers to participate vicariously in the experience described in the poem, while as a comment on the medium, it underscores the hybrid status of digital poems between text that we can read at our own pace and film that rolls before our eyes. What literary critics once hailed as "the unity of form and content" has become in this work the triple unity of interface, theme, and image.

Whereas "Cruising" keeps a balance between textual appeal and programming virtuosity, my second example, "Nine," by Jason Lewis, clearly tips the scale toward the second feature. A literary game, "Nine" (Figure 10) presents itself as a digital version of the nine-tile puzzle. This puzzle, which most of us remember from our childhood, consists of a frame holding eight tiles and an empty space arranged in a 3 by 3 grid. The purpose of the game is to slide the tiles until a certain pattern is created: for instance, arranging the numbers 1 to 8 in ascending order or reconstituting a picture. Thanks to the volatility of inscription of its medium, "Nine" adds a new dimension to the game by associating each tile with multiple image fragments: twelve in this particular case. As the player holds down the mouse button on a tile, the twelve images fade into each other in a continuous loop. The task of the player is therefore twofold: get all the tiles to display fragments of the same image; and then slide the tiles to unscramble the image. For inexperienced players, the puzzle is nearly impossible. But solving the puzzle is not the point of the text, and, in fact, it goes against its symbolism.

"Nine" creates a new twist on the classic game by associating it with a narrative. Every time the player moves a tile, a fragment of a story appears in the empty square. Rather than ascribing a specific square on the grid to every narrative fragment, the program displays the first fragment in the square left empty after the first move, the second fragment in the square vacated after the second move, and so on. This means that no matter how the reader plays the game, he will read the text in the same order. The variable, fragmented,

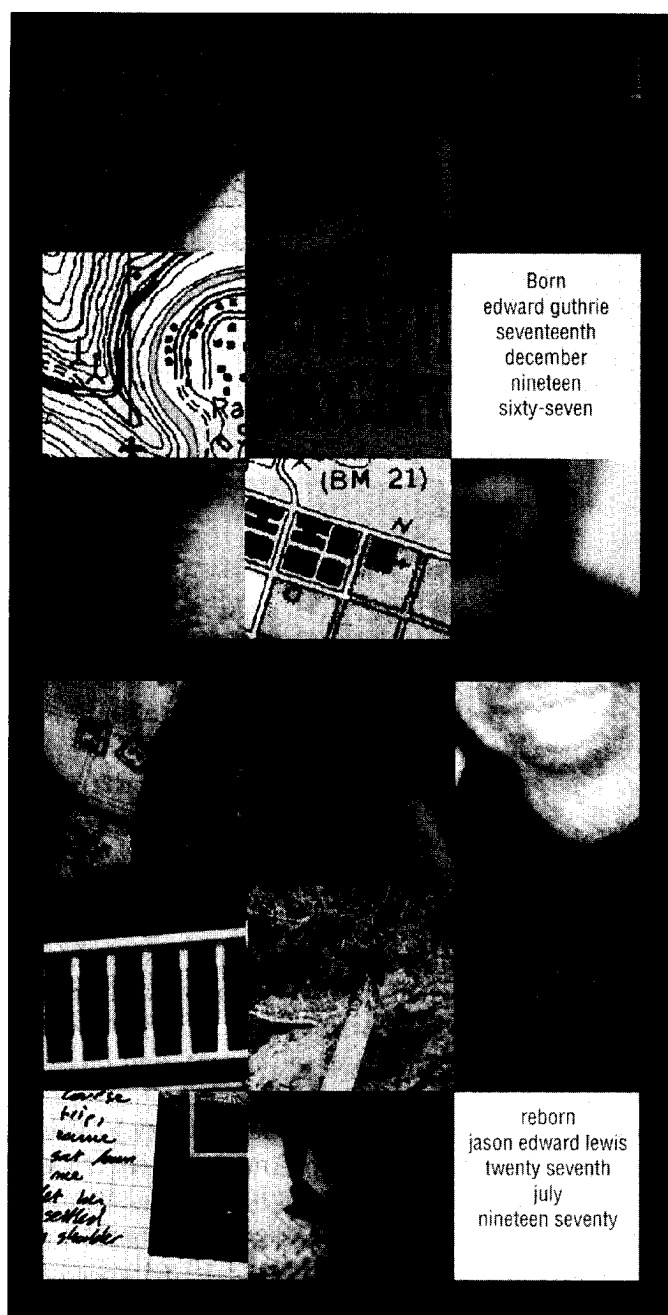


Figure 10. Screen shots from "Nine," by Jason Lewis, slightly modified to enhance readability of text

problematic aspect of the text to the level. As the author describes it, "presenting images from the lives of the in-and-out of focus, in tension with a mockery of the clean linear story through them."

With its twelve layers of images, other, the version of the game of the impressive programming feat, but the narrative? An autobiographical text of the author, the son of a Cherokee but raised in a white family, to re-

born edward guthrie seventeenth
reborn jason edward lewis twenty
son of a white family from the fo-

The narrative retraces the travel. Wherever he goes, his identity is Turk; in Indonesia, as a "rich guy am native." Are these false identities others because of his brown skin, ty, coming to terms with the very selves in one body? The cryptic of the ambiguity: "now I hear Edward me, his brothers and sisters from Would the meeting of Jason and nonwhite self, or would it represention and multiplicity as the essence

Through the attempt to reassemble the reader reenacts the identity quest of include topographical maps of the pictures of the places represented Jason in these various locations. To ferent Jasons to put back together. But the reader is not supposed to. The author explains in an accompanying "Nine" is a dynamic poem about the a puzzle and the insistent need to pursue parallel yet conflicting goals.



m "Nine," by Jason Lewis, slightly modified text

problematic aspect of the text thus resides entirely on the visual level. As the author describes it: "'Nine' is a dynamic poem presenting images from the lives of the artist, constantly shifting them in-and-out of focus, in tension with, and making something of a mockery of the clean linear story told by the text which winds through them."

With its twelve layers of images that smoothly blend into each other, the version of the game of nine implemented in this text is an impressive programming feat, but how does the game relate to the narrative? An autobiographical text, "Nine" tells about the attempt of the author, the son of a Cherokee woman and an "Island man" but raised in a white family, to reconnect with his racial identity:

born edward guthrie seventeenth december nineteen sixty-seven;
reborn jason edward lewis twenty seventh july nineteen seventy;
son of a white family from the foothills of northern california

The narrative retraces the travels of Jason in pursuit of Edward. Wherever he goes, his identity changes: in Berlin he passes as a Turk; in Indonesia, as a "rich guy from Jakarta"; among natives, "I am native." Are these false identities, imposed on Jason/Edward by others because of his brown skin, or is Jason, through their diversity, coming to terms with the very contemporary notion of multiple selves in one body? The cryptic end of the poem does not resolve the ambiguity: "now I hear Edward Guthrie racing to catch up to me, his brothers and sisters from the Islands joining the chase." Would the meeting of Jason and Edward restore Jason to his true, nonwhite self, or would it represent the acceptance of fragmentation and multiplicity as the essence of identity?

Through the attempt to reassemble the images on the tiles, the reader reenacts the identity quest of the narrator. The twelve images include topographical maps of the various places visited by Jason, pictures of the places represented on the maps, and photographs of Jason in these various locations. There are consequently several different Jasons to put back together, each rooted in a different place. But the reader is not supposed to succeed at this task: as the author explains in an accompanying sound file, "Life is a puzzle . . . 'Nine' is a dynamic poem about the impossibility of finishing such a puzzle and the insistent need to keep trying . . . The reader must pursue parallel yet conflicting goals: Assemble a complete image,

even as it constantly slips away, and pursue the text as it unfolds, even as it forces you to constantly rearrange the tiles." Through its implicit conception of identity as hopelessly elusive and of the experience of fragmentation as inevitable, this way of reading the text may be symbolically satisfying, but it is unlikely that readers will divide their attention between the story and the game, as the author would like them to do. I read the story first (it can be done in eight moves) and then started playing more deliberately with the tiles. I quickly gave up the hope of reconstructing coherent pictures by playing by the rules, but when I restarted the game, I discovered a trick that makes the puzzle easily solvable without moving a single tile: when you first open the file, the tiles display fragments of different images arranged in the proper order. All that needs to be done to reconstitute the various pictures is to hold down the mouse button on each tile long enough for it to display a fragment of the same image as the other tiles. What should we make of this easy solution, in view of the general theme of the text? Is identity something given at birth that we lose as we begin to play the game of life? Is a return to origins—the initial state of the game—the key to finding oneself? If so, the cheating reader succeeds where the narrator fails—Jason hasn't yet reconnected with Edward at the end of the story, and even if he had, the name "Edward Guthrie" is itself an Anglo name that hides his racial origins. Maybe I am overinterpreting. But the contrast between the virtual reading experience described by Lewis and my actual reading strategy is the inevitable consequence of the tendency of authors of avant-garde art to conceive their work, programmatically, as a game whose rules must be spelled out to the reader. If somebody wants to impose rules on us, aren't we free to cheat?

Director

Another Macromedia product, Director, is more popular than Flash for large, CD-ROM-based projects. The description of Flash given above applies, in its broad lines, to Director as well. But whereas Flash has a full range of animation effects for both text and images, Director seriously limits the behavior of objects made of text.⁷ With Director, bit-map and vector graphics can stretch, rotate, fade, and change color, but about all that can be done with alphabetical text, in terms of visual effects, is to make it move across the screen. For this reason, Director does not lend itself as

well as Flash to the dance of le however, can embed small Flash the Flash effects at its disposal that facilitate the development of a better narrative tool than Flash meaning that needs a reasonable these features is a device called gather all the data-objects—text clips—that will appear in the p keep track of a large number of ferent environments. The other movies within movies, so that the ect, devoting, for instance, a separate episode. One problem with the p however, is the absence of a feature Storyspace and computer games user to save a reading or playing narratives must either be readable that allow readers to remember have already visited and which o designed Director text should als to jump quickly to the latter.

Perhaps the most significant co to digital textuality is to have ma sorially rich texts sufficiently sim able by a single author or by a sm cial movies and computer games by large designing teams and are of the market, Director lends its do-it-yourself, cottage-industry expression: projects such as bui book, reconstructing a family s preserving cultural memory. It is stories, or the story of our com pictures without incurring the ex mentary movie or publishing a gl

Though it is the product of t movie produced by Michelle Glase Louise Xavier (Figure 11) is per sonal quality. To call this text a r

way, and pursue the text as it unfolds, instantly rearrange the tiles." Through entity as hopelessly elusive and of the as inevitable, this way of reading the satisfying, but it is unlikely that readers between the story and the game, as the lo. I read the story first (it can be done rted playing more deliberately with the ope of reconstructing coherent pictures t when I restarted the game, I discov- uzzle easily solvable without moving a pen the file, the tiles display fragments d in the proper order. All that needs to various pictures is to hold down the ong enough for it to display a fragment er tiles. What should we make of this e general theme of the text? Is identity t we lose as we begin to play the game as—the initial state of the game—the the cheating reader succeeds where the t yet reconnected with Edward at the he had, the name "Edward Guthrie" is des his racial origins. Maybe I am over- st between the virtual reading experi- d my actual reading strategy is the in- tendency of authors of avant-garde art grammatically, as a game whose rules reader. If somebody wants to impose cheat?

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well as Flash to the dance of letters of concrete poetry. (Director, however, can embed small Flash files, so that technically it has all the Flash effects at its disposal.) On the other hand, the features that facilitate the development of large projects make Director into a better narrative tool than Flash because narrative is a type of meaning that needs a reasonably large frame to develop. One of these features is a device called the cast, where the developer can gather all the data-objects—text, images, sound files, and movie clips—that will appear in the product. The cast makes it easy to keep track of a large number of objects and to reuse them in different environments. The other feature is the possibility to embed movies within movies, so that the designer can modularize the project, devoting, for instance, a separate movie to every self-contained episode. One problem with the production of large narrative texts, however, is the absence of a feature that figures prominently in both Storyspace and computer games, namely, the possibility for the user to save a reading or playing session. This means that Director narratives must either be readable in one session or use structures that allow readers to remember easily which part of the work they have already visited and which ones remain to be explored. A well-designed Director text should also offer tools that make it possible to jump quickly to the latter.

Perhaps the most significant contribution of Director (and Flash) to digital textuality is to have made the design of multimedia, sensorially rich texts sufficiently simple and economical to be addressable by a single author or by a small group. In contrast to commercial movies and computer games, which are expensively produced by large designing teams and are therefore enslaved to the tyranny of the market, Director lends itself to individual projects with a do-it-yourself, cottage-industry quality that give free room to self-expression: projects such as building an autobiographical scrapbook, reconstructing a family saga, exploring local history, or preserving cultural memory. It is now possible to tell our personal stories, or the story of our community, through text, music, and pictures without incurring the exorbitant costs of making a documentary movie or publishing a glossy illustrated book.

Though it is the product of teamwork, *Juvenate*, a Director movie produced by Michelle Glaser, Andrew Hutchison, and Marie-Louise Xavier (Figure 11) is permeated with this intimate, personal quality. To call this text a narrative may seem to stretch the