

Seeking Dynamic, Adaptive Story Environments

We live in an age where the new and innovative tend to obscure connection and continuity. Multimedia has grown from traditions of literature, theater, cinema, and graphic arts, as well as computing. Unlike the literary and graphic traditions, which focus on communicating observations and fantasy as stories or story fragments, computing takes most of its cues from mathematics, particularly the mathematics of transformation.

While the past decade has seen dramatic progress in building more flexible media-capable hardware and software, new story forms have been slow to emerge. Interactive media—as we understand the term today—implies some dynamic control by the computer over runtime sequencing of the media content. The term also implies modification of the story based on the viewer's explicit or implicit feedback.

In his 1975 book *Soft Architecture Machines*, Nicholas Negroponte proposed the following paradigms as goals for computer environments:

1. the computer as designer,
2. the computer as partner to the novice with a self-interest, and
3. the computer as a physical environment that knows the human user.

This vision distinguished early experiments in interactive media at MIT's Architecture Machine Group. It remains today a high-level taxonomy by which we can gauge the nature of specific work.

Clicking here, clicking there

How far have we come in developing powerful media experiences in which the computer becomes knowledgeable partner, designer, or guide? To evaluate the situation, I will describe a range of work, some of which was presented at the first International Media Festival held this June in Los Angeles as part of Digital World. I will also describe some of the MIT Media Lab's current work in media stories. Finally, I pay an all-too-brief tribute to Muriel Cooper, who spent the past 20 years teaching computers to be better designers.

The Interactive Media Festival's organizer, Lisa Goldman, launched the program with a question: "What is interactive media?" As those familiar with interactive environments well know, a hands-on experience is critical to understanding and evaluating such works. A gallery of 27 nominated works installed at Digital World met this need. Curated by Harvie Branscomb, it provided a sampling of the major types of interactivity being developed today, including published CD-ROM titles, games, network browsing applications, shared virtual spaces, interactive installation art, and cybernetic feedback.

As you might expect, published titles were well represented, although all seemed to have missed the point of "the computer as partner." In general, clicking here and there has become the interactive milestone. Occasionally, this is accompanied by a puzzle, as in "Myst" or "Xplora 1: Peter Gabriel's Secret World." While both applications contain beautifully digitized media, neither gives us a feeling of partnership or reveals any deep underlying structure.

While not my favorite application aesthetical-

In future issues, *Visions and Views* will examine and seek to establish taxonomies and principles relevant for interactive media, focusing on application domains.

- I Thinking of the interface as a narrative element.
- I Taking the computer out of the box and the media off the screen and burying them in the physical environment.

"Wheel of Life"

Two years ago, Larry Friedlander and I attacked the problem of creating a responsive physical environment that knows the user. In a collaboration with 20 MIT students, we mounted a show entitled "The Wheel of Life." This experimental installation drew on ideas from architecture and theater as well as communication and computing. The central idea was to create a story environment that could support collaborative interchange between two players. The audience was invited to experience the story by taking on the role of "explorer" or of "guide." In 13 weeks of rapid development and prototyping, we implemented three worlds: "Water," "Earth," and "Air." Here, in brief, is how they worked.

"Water" was instantiated in a 40-foot-high, fishbowl-shaped environment of translucent scrim on which images were rear-projected. By entering the space, the explorer initiated the story. Metaphorically flung to the bottom of the sea by an enormous hand, the explorer found herself surrounded by singing fish, including a huge, muslin-covered-rebar walk-in whale with a brilliant pink mouth. The guide's job was to encourage the explorer to strike up a conversation with the whale using a compendium of visual and whispered cues. If the explorer could get the whale to sing, she was rewarded with a joyful rite of passage.

The story of "Earth" was inspired by poet Percy Bysshe Shelley's "Ozymandias." The "lone and level sands" were contained in a large rectangular enclosure replete with broken columns, an arch, and the ruins of a wall. Sensors detected and indicated the explorer's movements. As an explorer entered this space, he was advised that through a process of discovery he could help restore these wastelands to life. The explorer was led from task area to task area by emphatic changes in the lighting and messages from the guide. In one interaction, the guide triggered short movies with audio snippets from Shakespeare, such as, "It is the East and Juliet is the sun." These played in small monitors buried within the columns of the arch. If the explorer deduced the disguised instructions to stand on the designated points of a pressure-sensitive

compass set into the floor, his insight was rewarded.

The experience of "Air" took place in a large inflatable mylar spaceship caught in a red nebula. Five crew members implemented in video were distributed around the circumference of the ship. The

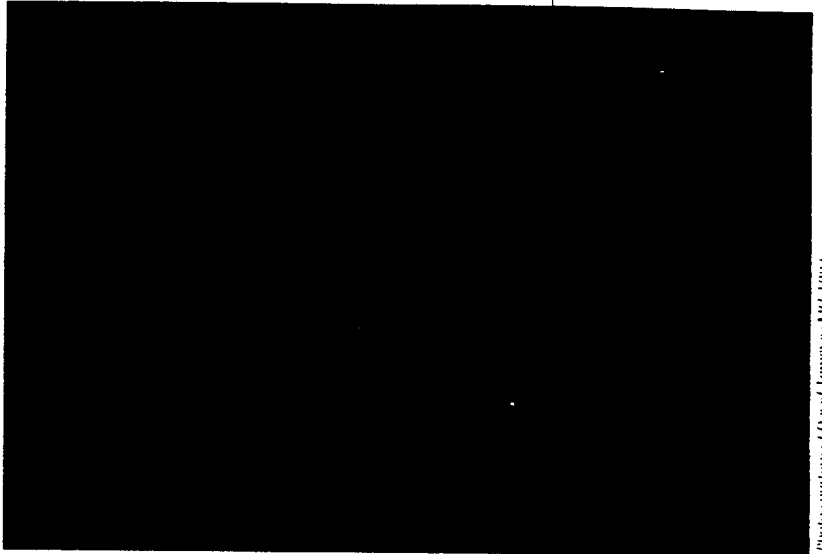


Photo courtesy of David Tamney, MIT 1993

explorer was encouraged to awaken them from their trance-like red state into their active blue state. Unless the explorer could transform all, the ship could not survive. To free the crew, the explorer had to discover pressure-sensitive spots on the floor in front of the monitors and activate these sensors in the correct order. To provide valuable assistance to the explorer, the guide had to first master a video game. This relationship between guide and explorer was perhaps the most interesting of the three because both guide and explorer began as novices within their own separate environments. Over time they became partners.

While combining the theatrical and the thematic created an intriguing experience, we discovered four serious flaws in our implementation. Technically, the network and sensors we used were too slow in responding to user input—the sluggish response sometimes made explorers doubt that they had done the right thing. Theatrically, it was more difficult than we had expected for some explorers to situate the story—a small percentage of disoriented explorers never quite "got it." Temporally, because of the demands of audience size and throughput, we had to limit visitors to 10-minute explorations of each of the three "worlds" rather than letting visitors take whatever time they wished, and we had to increase participation to three explorers and three

When will the whale sing? The explorer finds herself in a fishbowl. The guide sends video messages in through the fish: "go left," "come here," "talk to me." Once the explorer engages in a conversation with the whale, the whale tells his story. From "Wheel of Life: An Interactive Transformational Environment," co-directed by Glorianna Davenport and Larry Friedlander, The Interactive Cinema Group, MIT Media Laboratory, January 1993.

guides per session. Structurally, all of the interactions were simple and task-oriented, and therefore were not quite as magical as could be achieved with complex, rule-based transformations or other heuristics. However, on the whole "The Wheel of Life" was well received, and it has inspired many researchers to explore content in a new way.

Constructing an adaptive storyteller system

Somehow, the notion of an interactive experience has come to assume a landscape of action. However, transformation and adaptation may better serve our goals of personalization and complexity. Why is this? If we examine the storyteller's motives, we see a growing need to

To return for a moment to Negroponte's paradigm, we can consider the paradigm of a designer, a partner, or an environment. The designer mediates a gamut of aesthetic choices—from the stuff of telling to the layout of a presentation. The presentation must invite input from the user that mirrors the narrative style of presentation. The partner knows the user and quickly makes judgments about the content and timing of delivery. The partner can choose a personality—strong and loud; an active conversationalist; or a silent, transparent guide who offers, when necessary, a knowing wink. The environment has a deep knowledge of architecture and physical movement, and disperses the story in space and time based on the user's activities.

Flying through an information landscape

On the road toward the design of complex information spaces, we have all too few brilliant mentors to show us the way. One who touched many of us recently passed away, suddenly and without warning. We will miss Muriel Cooper in more ways than we now know.

Muriel was an expert in the old tradition. Painting and sketching from an early age, she graduated from the Massachusetts College of Art in 1948. As she emerged from a traditional art education, she discovered that she had salable skills in the area of graphical layout. These skills led her eventually to the MIT Press, where she designed and produced more than 500 books, including *Bauhaus*, a spectacular tribute to what has become a design legend. Always looking for new challenges, Muriel left the Press in the mid-1970s to join the MIT faculty.

For the next two decades, Muriel built the Visible Language Workshop with her collaborating partner, Ron MacNeil. There, in the midst of a community of talented students and colleagues, Muriel brought her keen sense of typographic space and dynamic design into the digital world. Once Muriel got an idea for a new technique, she would work with students to achieve several design examples demonstrating it. Throughout the growth of the VLW, Muriel was always excited to move up to the latest, fastest machine, but never with any loss in the quality of the design tools. For several years, she used the massively parallel Connection Machine to experiment with dynamic blur and transparency. Soon, she and Ron joined three 2,000 × 2,000-pixel monitors together to create a wide-screen, high-resolution display. Typically, a world map is displayed across



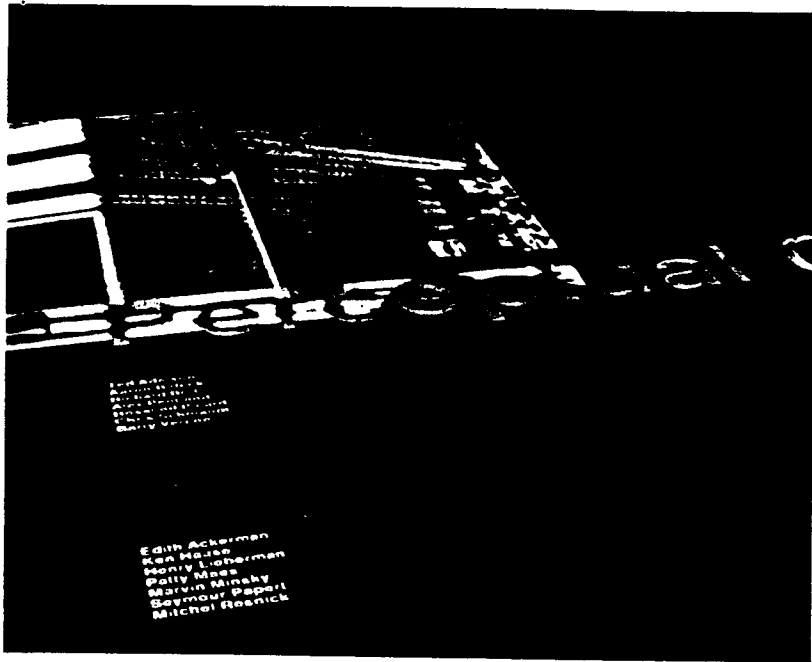
Photo courtesy of Barry Hetherington © 1992 MIT Media Lab

Muriel Cooper, Director of the MIT Visible Language Workshop, 1975-1994.

communicate in ways that speak to the opportunity and choice that surround us. Opportunity and choice lead to complexity. We want to achieve a collaboration between the storyteller and the explorer, in which the storyteller can offer more and the explorer can have more choice in shaping the experience.

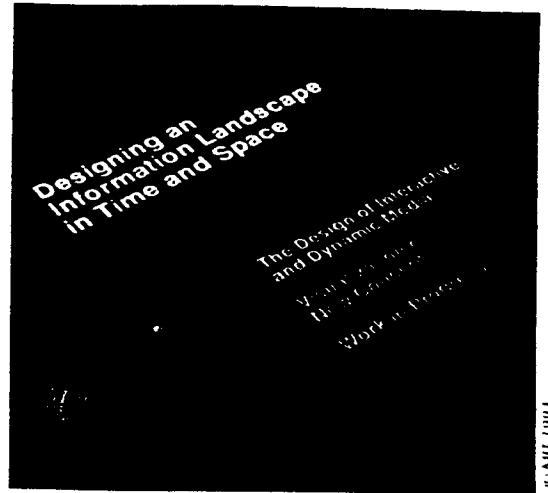
What do we need to consider to make the experience meaningful and dynamic? First and foremost we need a compelling story. Whether of this world or of other worlds, the story must be of general interest—news, current events, information, fantasy. Next we need knowledgeable media agents—agents that can respond almost as personalities, appropriately merging the presentation space with the story elements.

How do we construct these agents so that they do not knock the user down but rather enhance the sensation of discovery?



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Designing an
Information Landscape
in Time and Space

The Design of Interactive
and Dynamic Media

Visible Language
Workshop, MIT Media Laboratory

the screens. It is dynamically overlaid with news articles as they come off a news feed. The stories are spatially distributed according to their geographic content. Over time, the stories fade. The density of the map relates to the density of news for a particular geographic location.

Two years ago, inspired by *The Powers of Ten* by Charles Eames and Philip Morrison, Muriel mused on how we might create an infinite zoom of world history. The thought spawned a design example: an animation that allows us to fly in from outer space, down, down into a home lot, and finally to the bottom of a swimming pool. Of course, the zoom is reversible. You can go back out as easily.

Muriel had an absolutely incredible eye. Never was her eye more sensationally integrated into dynamic expression than in her final "Information Landscapes," which she premiered

this February in Monterey at TED5, a design conference organized by Richard Saul Wurman. The final set of design examples, created on a Silicon Graphics Reality Engine, premiered concepts not just of navigation but also of system learning, which can be used to personalize our information landscape. The ability to fly around an information landscape—modified based on incoming information and our use of the space—offers a new paradigm for bringing dynamic interaction into balance with intellectual coherence. Finally, we have a powerful example of the machine as designer.

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The viewer navigates through a dynamically changing information landscape. The landscape emphasizes spatial and conceptual linkages. The system may juxtapose information segments based on the user-defined paths. From "Information Landscape," Visible Language Workshop, MIT Media Laboratory.