7 A COMPARISON OF MUSEUM EXHIBITS IN THREE AREAS: ART, SPORTS, AND SCIENCE

Carol Strohecker
Mitsubishi Electric Research Laboratories
Cambridge Research Centre
USA

This paper describes design considerations and audience reception of museum exhibits intended to entertain and inform. Two of these exhibits (*A Different Train of Thought* and *Play Away, Please!)* were produced several years ago, at a time when the interactive-videodisc technology on which they were based was new and innovative. Since then, the state of the art of such technologies for display and interaction has evolved considerably.

Most of the old videodisc systems, relying as they did on the bulky analog video signal and branch-and-jump interaction strategies, now seem clunky and undesirable. So-called "multimedia" systems, based on digital video and audio, have superseded them. But even these successors are quickly being replaced by systems that have the potential of furthering an enlightened view of the user's role. By experimenting with a variety of display and input technologies, by providing spatial environments that users can explore in a freeform manner, and by providing tools for manipulating information in different forms, many new systems support learning through pursuing one's own processes of questioning and acting. Such systems are attempting to enable online the varied and holistic approach to design that has motivated the interdisciplinary exhibit, *Dreams Like Swimming in the Air,* from the beginning.

Following descriptions of the three exhibits, this paper concludes with some remarks about technical platforms, designing for interaction, and strengthening the quality of learning experiences through different applications of one collection of visuals, sound, and information.

A Different Train of Thought

This exhibit was designed as a so-called "interactive narrative," a new genre of movie. For the next several years, it was displayed in art galleries and as an exhibit at conferences for people interested in computer-controlled, interactive-videodisc technology. By responding variably to interactions from the user/viewer/participant, the movie experiments with a means of story development that focuses on the viewer's construction of impressions about the nature of each character.

The primary setting is a crowded, all-night commuter train in Eastern Europe. Exhausted and confused, an American woman finds herself in the conductors' cabin, trying

alternately to sleep and to field encounters with people who come and go during the ride, with whom she does not share a spoken language. In trying food and drink, arguing against a black-market exchange of currency, and quelling an attempted rape, the woman experiences an intensity of understanding and friendship that challenges a concept of communication as relying mainly on the verbal. To watch the movie is to see a divided image on the television screen. At the bottom are pictures of the characters' faces, each of which appears at different times. The top of the screen shows the motion picture. As the story unfolds, you see in this image the people whose faces are shown below. You touch one of the faces - say, the main character's. Suddenly the moving picture is no longer of the scene in the train, but of her thoughts: flashing by are images of the family she had visited, of passing scenery, of a concert she might like to attend, and so on.

The stream of images plays out and you are suddenly "back on the train." You can allow the current scene to continue, touch the picture of another character's face, or even touch the woman's face again to see how her thoughts may have progressed since the last interaction. The timing and nature of the selections are so individualised that you become, in a sense, a character in the movie. Just as with the interpersonal dynamics portrayed by the movie, each viewer's model of characters and events is a function of exposure and interpretation.

Other videodisc-based projects, as well as work in theater and cinema, have explored the themes of variable point of view and multiple endings. *A Different Train of Thought* explores a different idea entirely. Images shown as the result of interaction are related to a chosen character's impressions in many possible ways. Collectively, the images describe associations that characterise people's thinking. The result is, perhaps, a visual representation of stream of consciousness, one that is different each time the movie is seen. Flashback, premonition, déjà vu, and even dream-states are all fair game, and the viewer's train of thought is as much a part of the movie as that of its characters.

The structural context into which thought images are variably embedded was developed by intercutting documentary footage of Budapest with enacted scenes. The minimally assembled set blends with interior shots of the Orient Express. The result is a quickly paced rendition of events on the train, in a traditionally linear segment. You can watch this 13-minute segment without interacting, or choose characters whose thoughts you would like to see at a given moment within this context.

Reactions to this "movie" have been mixed. Many people do not get beyond the low quality of the audio and video signals (which were rendered with an old consumer-format VHS camera). Among people who do spend time with the movie, many are intrigued by the notions of stream of consciousness, characters perceived as a function of selective exposure and interpretation, and the variable embedding of certain scenes into others. But other people feel lost or get a sense of disconnection rather than the kind of coherence and flow that they want from a movie experience. Reactions seem to depend on people's enjoyment of the images and the story they construct, as well as preferences for thinking about new genres in film and for playing with new technologies.

Play Away, Please!

This is the exclamation that opens championship tournaments sponsored by the United States Golf Association (USGA). The USGA runs a museum that displays artefacts related to the sport of golf and describes its development and practices. An interactive-videodisc exhibit includes segments on the history of the game, swing styles of champion players, considerations in designing a golf course, and a trivia game about the sport and its participants. A timeline shows sketches of champion golf players, clustered according to

20-year eras since the beginning of the century. Touching one of these clusters shows the appropriate short segment, characterising the players and the nature of the sport at the time. The segments were assembled with footage from television networks and the USGA archives.

The "Swing Styles" section demonstrates the value of visual comparison. Golf players are shown in side-by-side windows, and the clips were timed backward and forward from the moment of the club's contact with the ball. Thus, when the clips begin, the players are at varying stages of upswing, and as the clips end, the players illustrate varying styles of follow-through. Today's technology could improve this section by allowing digital images stored on a hard disk or CD-ROM to be shown in any combination. At the time of the exhibit's design, the limited space on the analog videodisc required that only a few pairs of champions be selected for recording and later display.

An introductory segment about considerations in golf course design, as well as descriptions of the design of some famous golf courses, leads into an activity in which museum visitors construct their own online golf courses. Using the touchscreen and graphics for tees, bushes, ponds, sandpits, and other accoutrements, visitors compose arrangements that answer needs and challenges of the area surrounding a given golf hole. With today's computational and graphics capabilities, of course, such an activity could go much further by simulating the play of the ball as users make their way through an area.

The trivia game incorporates footage from other segments, plus some additional short clips. These clips form the basis of trivia questions about the game of golf and its notable competitors. Museum visitors can play singly or in pairs. The computer keeps score for them and, if they like, provides a printout at game's end.

This exhibit has been well received. As people wander through the galleries, they enjoy pausing at the kiosk and spending a few minutes to play with the different activities and think about the information each presents.

Dreams Like Swimming in the Air

This is how the pilot of the "Daedalus" human-powered aircraft, Kanellos Kanellopoulos, described his dreams before the record-setting flight across the Aegean Sea a few years ago. His phrasing is poetic, but hints at a phenomenon of deep scientific interest: the reason a plane can fly at all. The phenomenon of lift, has to do with air pressure changes introduced by the peculiar shape of the wing. Understanding this phenomenon came at great cost in terms of time and even human life. Like Icarus, the mythological son of Daedalus, bird-watching empiricists trusted contraption after contraption in search of this key understanding - and many didn't survive the experiments. Why does such a pervasively present phenomenon evade our intuition?

Kanellos's description is eerie in its naive capture of a fundamental clue: water and air are similar. Properties of fluid dynamics belong to each element. This point may provide an important lead in thinking about the design of environments that could come to foster intuitions about the nature of flight. Imagine, for example, a simulation in which air and water are expressed along an experiential continuum: a whimsical creature leaps from an asteroid to earth - and travels through various densities in layers of atmosphere, coming closer and closer to the surface of the earth, finally splashing into the ocean, where the downward voyage continues as the creature experiences still further changes in densities. The user of the simulation feels these changes as pressure changes, perhaps through a glove or some other device connected to the computer. Understanding lift is still a long way from this experience, but the simulation may provide a step toward connecting

common-sense knowledge about pressures we feel when in water to some sense of pressures in the air.

This sort of simulation is just one aspect of material relevant to an exhibit about the Massachusetts Institute of Technology's Daedalus Project. This project involved the design and construction of a human-powered aircraft that flew 75 miles over water (the Aegean Sea), topping records set years ago by the Gossamer Albatross in its flight across the English Channel.

As the Daedalus was being constructed, I proposed production of an interactive videodisc to support various functions: visual documentation of the project, a computerised supplement to textbooks and lectures for aeronautics courses, and a museum exhibit to bring the aspirations and realities of this ambitious project to a broad public. So far only concept videos and a demo based on a small videodisc have been completed. However, the project continues to provide a rich basis for rethinking general issues about design and presentation using currently available technologies, and based on interdisciplinary and constructive approaches to learning.

This museum exhibit presents especially exciting possibilities in that an interactive display could be accompanied by flight simulators like those the pilots used in training, as well as by the Daedalus aircraft itself (which currently is on display at the Museum of Science in Boston). Thus the notion of the "learning environment" can expand beyond just a kiosk-like display, to an entire space containing computerised exhibits and other relevant items with which visitors can work and play. A number of simulations, such as the one described above, could enliven and mobilise understandings of principles of flight. Modules of the online presentations could address scientific as well as humanistic dimensions: design of the airfoil, lightweight materials used in the aircraft's construction, athletics and physiology involved in developing a human "engine", flying animals, a history of flight, and inspirations provided by the ancient Greek myth of Daedalus.

I have described this exhibit as being in the realm of science - but obviously, like science itself, the exhibit involves much more than just one realm of interest. This multivariate property fuels its potential as a particularly interesting museum exhibit - and, for that matter, as a promising learning environment.

Designing for Interaction

The touchscreen technology used for the first two exhibits described here may be considered more appropriate in one case than the other.

A Different Train of Thought deals with concepts of communication - how it can be both subtle and pronounced, and both effective and obscure. Touching is a fundamental mode of communication, even in the sparse form that viewer/participants must adopt as they adjust to interacting via a touchscreen. The primitive poking gesture is, in fact, used by some of the characters in the movie to get one another's attention or acknowledge a momentary understanding. By repeatedly employing this gesture, participants may enter a frame of mind that is irreverent in a way quite consistent with the spirit of the movie.

In *Play Away, Please!*, however, the touching gesture doesn't allude to anything particular in the content of the exhibit. Furthermore, this single gesture is used to effect a variety of changes in the display. A sense of superficiality can result that is unfortunate in this piece and in many like it. Sometimes the limited gestural bandwidth is a function of a touchscreen, sometimes of a mouse or other device/s. But wherever there is a mismatch of input technology to the nature of the content and the experience, the result will be somewhat dissatisfying.

Of course, such an assertion demands comparison with the contradictory statement. More and more researchers are experimenting with elaborate input devices like data gloves and wired body suits, and output devices like head-mounted displays. The attempt is to maximise the intensity and diversity of a user's sensory involvement with computer-generated environments, which typically include seemingly three-dimensional graphics and sound, and sometimes emulate how textures and surfaces feel when touched. The implicit (or explicit) goal is to simulate the nature of a real-life experience as closely as possible (hence the over-used term, "virtual reality"). The question becomes how far to go, or how far it is possible to go, with such interface techniques. Ideally, the answer will depend not only on technical capability, but on judgments of appropriateness, given the content and purpose of an application.

It is interesting that at a time when museums are increasingly looking to technologies to assist in the display and communication of ideas, the technologies have reached a point at which their development can benefit by looking the other way: museum professionals already know a lot about designing experiences in which people are immersed in a three-dimensional space. They already have answers to some of the important questions, like how to facilitate navigation and how to focus attention on certain ideas.

As important as discussions of interface may be in the design of an exhibit or similar application, they can sometimes distract from the most vital concern, that of developing the content and its capacity to engage people. One of the tenets of museum-exhibit design can work against the latter: designing for experiences of just a few minutes may keep the traffic moving through gallery spaces, but prevents the immersion that a productive learning experience demands.

The design of *Dreams Like Swimming in the Air* addresses this problem by tailoring the body of information selectively for different applications, of which a museum exhibit is just one. The others proposed are learning-environment software and an interactive artwork, as described earlier. Including flight simulators and the actual aircraft with the hypermedia piece already broadens the notion of "exhibit." Coordinating with the other applications extends it even further. Referring people to a nearby art gallery presenting the related piece can become part of the museum's community outreach efforts, as can cooperation with universities where the related simulations and software are used with courses. High-bandwidth fibre networks can enable shared use of the programs by university students and museum visitors, some of whom may even want to join in from their computers and modems at home.