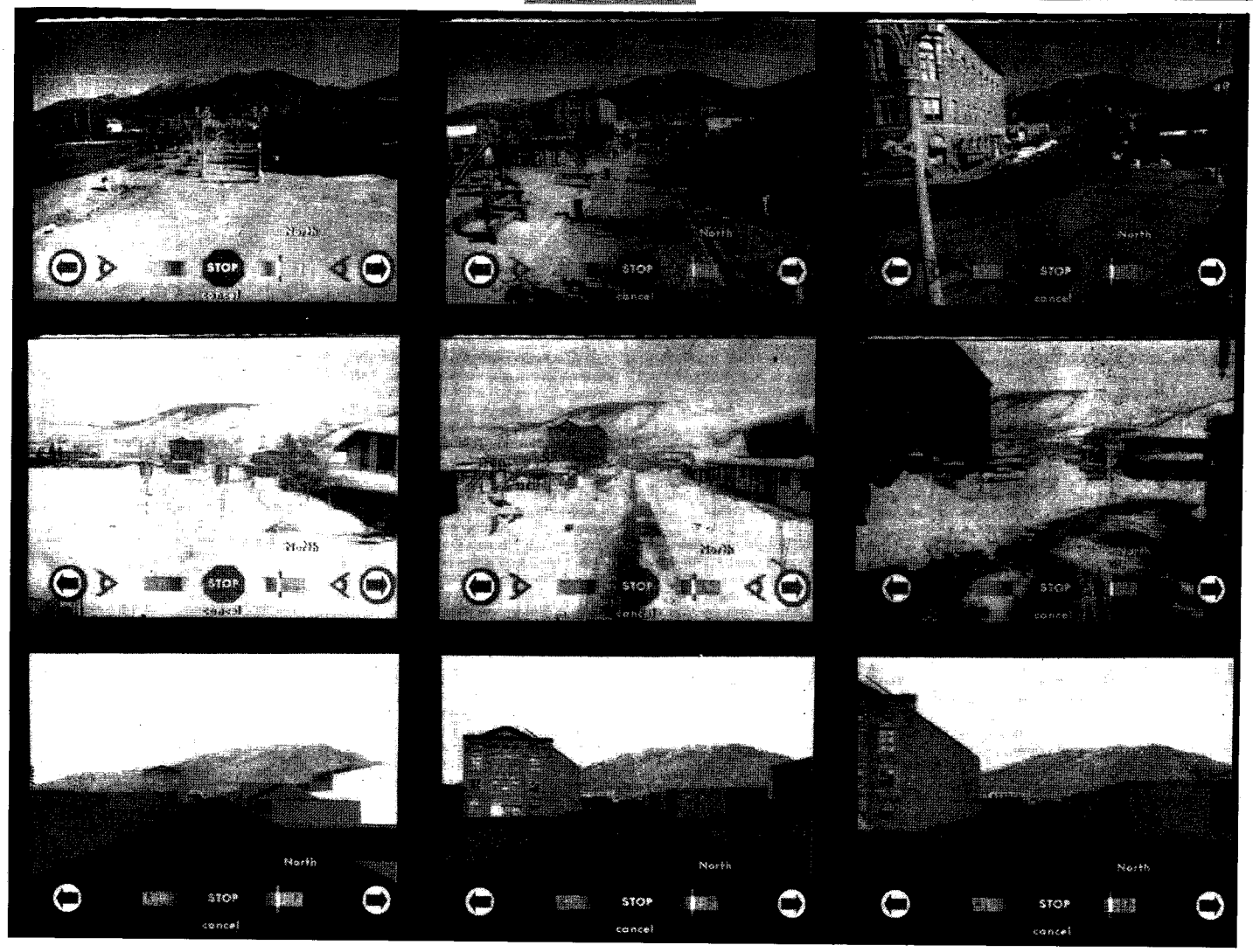

THE OPTICAL VIDEODISC AND NEW MEDIA FORMS

BY Michael Naimark

I've decided to sandwich most of this lecture on videodiscs between two spatial examples. This one for obvious reasons is called *Eyepiece*. I wanted to show it as an extreme example of nonconventional movie form. I produced it about two years ago. As you can see, it's not flat, not rectangular, not particularly made to be viewed passively. It's not a linear story in the sense of having a beginning, middle and end, and it is site specific: the environment in which it's played becomes part of what's going on. In this case, it was really an old technology that could have been done fifty—really eighty—years ago. And the technique is nothing more than a 16mm loop projector and a small rear screen dome, often called relief projection. It's very similar to what makes the talking heads talk in Disney Land.

Movies, with very, very few exceptions, have always been flat, rectangular, sequential, passively viewed sitting down, and the same movie for every viewer. And, in a formal sense, movies really haven't changed since the beginning. I think this is about to change and to change quite drastically.

One of the consequences of the electronics and the computer revolution is that fixed parameters may now become variable, or, more appropriately, programmable. Many of these parameters in movie making really haven't been questioned before, and I'll give you two examples. Sound movies run at 24 frames per second in this country, always have, ever since optical sound. The video disc can play at a variety of frame per second rates, and that's programmable; and what I suspect and hope will happen over the next few years is a video disc camera developed that could do a similar thing. Another, perhaps milder example: most of you have probably been in the large screening room here and noticed that the Sony video projector has a cinemascope screen. In a very crude sense, that's a programmable-shape video projector. That's never been done before. And there's a lot of possibilities there, I think, in terms of programmable shape, if you get beyond only two options, and beyond rectangular.

There is a theme here and the theme is: given an acknowledged need for a harmony between content and medium, there exists today a need for greater range of media forms. As our society gets increasingly more complicated, I think this becomes more critical. And, more importantly, there exists a need now for further experimentation, study, and even play into some of these new forms.

For example, we know that epic movies don't work on T.V. When *2001*, *Apocalypse Now* or *Ben Hur* is on T.V., it usually comes off kind of laughable. Conversely, T.V. stuff, particularly commercials, and I think soap operas, when blown up very big are equally laughable. And as similar as the film and video medium are, we still can't seem to agree on what the *"film look"* and the *"video look"* are. Everybody sees it. As we switch channels on T.V., we can tell if something is produced in film or produced in video.

There is not much diversity of form in moving images, and diversity in any cybernetic system is generally a sign of resilience and adaptivity and health. And I think we're gaining tools to create a cornucopia of media palettes and canvasses from which to choose. And that leads me into the video disc.

Now, I will be concentrating mainly on the optical video disc, the laser discs which are compatible and made by Sony, Disco Vision Associates, MCA, IBM, Pioneer, Magnavox and Phillips, not to be confused with the groove system of RCA or the other systems, JVC for example. Of the laser discs, I'll be concerned mainly with the constant angular velocity discs—CAV—where each frame constitutes one rotation, and in doing so allows the possibility to still-frame anywhere. Like a phonograph record, video discs are "read only" media, you cannot record on them or, more specifically, if you can record on them, it's only once.

There are two unique features to the video disc. The first feature is that they're cheap. I'd like to break that down into short term and long term. They're cheap in the short term in that they're about $1500 to $2000 to master for the first disc, and the second disc is $5 to $10 dollars, and that drops with quantity. Theoretically, it's been claimed that the price will be about that of a phonograph record to make. In the long term, and, I think this more significant, they don't wear out! The information is stored under an acrylic layer, and the laser is out of focus when it touches the surface, and ignores it. Every now and then we found, at MIT, after playing lots of discs that sometimes they do get a little bit "grungy"; and, what do you do? You clean them off (wipes disc on pants), and it works.

The cheapness is the main reason why video discs were made. I think we all know this. I believe it started around the late 60's where MCA had tens of thousands of films in their film library that, on the one hand they felt people wanted to see, and, on the other hand, didn't justify showing in the theater where you need a few hundred people to make any money. So, the memo went down the ranks: invent a cheap source of distribution for recycling movies. And this is what they came up with. But there is another feature, and I believe this feature was unplanned. *Random access.* Because it's a disc instead of a lengthy sequential medium, and the frames are stored concentrically, to get from beginning to end you traverse the distance. O.K.? So when I say random access, what I really mean is *fast* random access, because tape and film are random access media too. A subset of random access is that it can still frame: it can play in a variety of frame per second rates, and it can play forward and backward. One thing to add to that is that each frame on this disc is internally numbered, and I can address it, and, for that matter, a computer can address it. Constant angular velocity discs hold a half hour of video per side. At 30 frames per second it turns out to be 54,000 frames. And all this can be controlled by computer. But first what I'd like to do is to discuss briefly the last time—big time, I believe—that a medium left from an expensive sequential medium to a cheap random access one.

And I am referring to when the scroll turned into the book. Around 3,500 B.C. in Egypt, papyrus scrolls came into normal use. They were made from the papyrus plant of the Nile delta. And they caught on. They caught on to the Greeks and the Romans, and stayed around for quite some time. They weren't so bad. They weighed a lot less than stone or clay tablets, but they were sequential, right? They were scrolls, and to go from one end to the other took some time.

Another point is that they were very, very valuable. There were no xerox machines. The copy costs were very high. Not that many people could read anyway, so it was kind of an elitist field. It was the main method of societal memory. So I don't want to underemphasize how valuable these scrolls were. In fact, we know from a recent movie that the places where some scrolls were kept were often attributed as having powers.

Since scrolls were very expensive and rolling them was tedious, I will speculate—only speculation—that fast forward and rewind were very rare. O.K.? Now a revolutionary change occurred 400 A.D.; the Codex form, the form of the book that we know today, came into being—that is, the binding, and a cover, and pages. And all of a sudden, lo and behold, you had pages you could index and access anywhere. Oddly enough—and this is not the case with video discs—the cheapness came along 1,000 years later with Gutenberg, in 1450 A.D. And the number of new titles of books has been growing exponentially ever since.

Now, I don't want to drive this analogy too hard, but in many, very real ways, movie, film and video tape are scrolls, O.K.? They are slow access, they are sequential, and in many respects they are expensive; and video discs are books.

Two points I want to make here: One is that the codex form, the modern day book form, made possible random access for the written word, and new forms like dictionaries, encyclopedias, and other reference forms evolved. Not only were they not practical with the scroll—and I'm speculating a little again—I don't believe they were seriously thought of. O.K.? The second point is that very obviously the random access option of the book did not seem to destroy in any way the desire to continue to produce standard, linear, sequential material, like stories, literature and narratives.

So, in that respect, let's start with a normal movie disc. I do believe, unlike others, that the discs are a fairly handsome method of storing movies and that there are tens of thousands, probably hundreds of thousands, of movies that might have some kind of market. Let me interject another point here. The fact that these things are not scratchable—and I've argued with people in the field about this and I seem to be in the minority—the fact that they don't scratch may mean that libraries will develop. O.K.? So why don't most people check out phonograph records from the library? I think the main reason is not inconvenience but rather that they're scratched. I might be wrong.

Let's go on now to something kind of in between the standard play and the still frame and I think the heart of what video discs can do, and that is interactive movies. And, as I hoped to point out by analogy by going from the scroll to the book, I don't think we really know what interactive movies are yet. And I think there's a lot of things that have to be tried.

The world's first interactive movie was in EXPO '67 in Montreal. The Czechs did it. I guess it's noteworthy, so I'll briefly explain it. A crowd of about this size sat down in an auditorium and there was a "yes" and "no," or an "A" and "B," button in front of you. You saw a typical boy meets girl type of film, and at the end of a certain scene, it cuts off, the lights come on, somebody walks to the center of the stage and says "What should happen now?" and gives two alternatives, and people press the buttons and they see the next scene for which they voted. They did this a very curious way, and it serves to illustrate how flukey the whole thing was. They very cleverly constructed a story where for every node where you had two options, at the end of each of those two options you would end up with the same two options. O.K.? It makes you think about fate a little bit. Now, in doing so, it means that all they had to do—and this is in fact what they did—was to run two film projectors in tandem and have one lens cap and switch it back and forth according to the audience. This is true.

Let me give you a couple of other interactive movie possibilities, and I won't break with tradition that seems to have developed over the past couple of years. So, start with a cookbook. The idea here is that you film what you might call visual primities of all the various acts of cooking—separating eggs and beating them stiff and things like that. You might want to put on a few hundred or a few thousand still frames of other things, finished products or whatever. Now again, this is with a computer, and that's critical. So the user comes along and types in "chocolate mousse." What they could possibly see, in a very real sense, may look like a Julia Child's program designed specifically for them. And that single disc could hold literally thousands of other programs, because of so many overlapping parts.

There's another aspect to this type of interactive movie, and that is that it could have hierarchical levels of depth depending upon how much the audience—the user—knows. So that it's conceivable, for example, that someone could make a disc on solar engineering that would have value played to an expert in that area. It could also be played in a standard *Nova* format, and it could be played to a four year old child. O.K.? Statements like "tell me more," or "I know more about this—skip it," could be used to go on.

The second example of interactive movies would be something conversational where the disc never stops, and it may require two disc players to do this, and it may be conversational in the sense that you are talking to the screen. Imagine if you recorded someone saying everything imaginable and you talked (laughter)—well, you know Buckminster Fuller claims that he can say everything he knows in I think 7 hours, or something like that—imagine you have a very intelligent computer (which is not that far off), a voice input and video disc system. You could sit in front of the screen and converse with someone. O.K.? It sounds like a wild idea but it's really quite possible, which leads me to the interactive movie, the movie map.

This was a project that was begun at MIT I believe in the fall of '78, with the Architection Machine Lab. The first goal was simply to invent a better map. O.K. Now remember that the Architection Machine Group are the people that brought you projects like *Spatial Data Management Systems* and *Data Space.* So this was up their alley. The second, converging goal was to experiment as much as we could with everything the Group wanted to try with interactive video discs.

The concept of the movie map is quite simple. It's to pick a town and film it, going down every street in town in every direction from all angles, make every turn in every direction in every intersection, and do this on film. (It turns out that if you're doing any kind of live action recording that you want to still frame for a video disc, video is the worst medium to record in. And it's because each video frame is made up of two fields and they're recorded over different time periods. Video animation is coming along, but for any kind of field application, I think film is better right now.) So we filmed going down every street in town, going all directions, making every turn, and at that point a clever film editor could take the film and effectively splice together any route desired. Right?

Now, sure, some things are never going to work. Somebody might have their car parked in a certain place when you filmed the straight-aways, and might have moved it when you came back the next day to film the turns. But the name of the game here, and I think this is important as a general principle for many interactive movies, are *match cuts.* Match cuts in cinematography are generally defined as a cut where there is visual similarity between the end of Scene A and the beginning of Scene B. The importance here is registration. In addition to simply making a better map, we thought, well, let's try to expand the definition of "map" as well.

The town we chose was Aspen, Colorado, for a number of real reasons. It was about the right size in terms of filling up the space of one disc. It was a bound town. There are exactly two streets leading in and out of Aspen. And when you think about what you're trying to do with a movie map, that becomes important. Another issue is that Aspen is in a mountain valley, and the four horizon views are very distinctively different, and we thought that would be a big win in terms of using this disc. There's a fourth reason that didn't occur to us until after we started, and that is we picked a town where the people were much too hip to care that you were filming down every street again and again, and that turned out to help.

The end result of all this is a user can sit in front of a television and drive through Aspen. We used a touch sensitive screen with computer-generated graphics, but we could just as easily have used a steering wheel. The user sees on the screen a movie of "driving down the street." As an intersection approaches, the user can indicate a turn, and the movie image turns accordingly. The trick here is to run two videodisc players in tandem, all controlled by computer that knows where everything is: one player is always playing while the other is cueing up. The result is continuous travel through town.

On the single Aspen videodisc, we can travel through town in both summer and winter, and also in a computer animated version. All three versions can be intercut. There are also facade shots, still-frames, of every facade in town, in both summer and winter, and others that are historical, from old Aspen, for reference. Again, the name of the game here is registration, so that images can be match cut. And with the historical shots this led to some amusing problems, such as a sapling suddenly grown to a full tree.

There are also matrices of still frames of a large map of Aspen, and another of a large aerial photo. Other things on the disc include slide shows about certain places of interest, such as the old hotel, short movies, an overview of the town to serve as orientation, and a panoramic experimental shot with a 360° lens. And, *all of this is on a single side of a single videodisc.*

The Aspen Moviemap, and other similar videodisc programs, are possible because of random access: 54,000 images rapidly accessed in any order, with the help of computer intelligence. But remember, this is all temporal, reordering time. Spatially, it's still television—we view it on a standard 525 line rectangle. Further expansion of this spatial realm is our next challenge, and on that note I will end.