

Meaning and the Interactive Narrative:

In the context of Object-Oriented Interactive Cinema

By: Adrian Jones

**Readings in Non-linear Narrative
Instructor: Jim Bizzocchi
Simon Fraser University Surrey**

The purpose of this essay is to discuss a framework for interactive narrative construction in the context of a particular model for multi-linear filmmaking called Object-Oriented Interactive Cinema (OOIC). I begin by trying to address important questions such as what is narrative, and why be interactive? I also discuss what it means to put 'interactive' and 'narrative' together, and I list a number of different types of interactivity. Next, I discuss some examples of interactive cinema that have been produced commercially or which have come out of academic institutions. Finally, I present an example of a work built upon the OOIC model, an installation piece called 'Re-Waking Life.'

As I have provided the details of the Object-Oriented Interactive Cinema model in previous papers, I will not do so here. For further information on OOIC please visit the following website:

<http://tonka.research.techbc.ca/ActiveScreen/Discussion/ObjectOrientedCinema/>

I. What is Narrative?

The question of "what is narrative" is difficult and extensive. For the purpose of this essay I am going to limit my discussion to what narrative is in the context of Object-Oriented Interactive Cinema.

"A narrative is a sign with a signifier (discourse) and a signified (story, mental image, semantic representation). The signifier can have many different semiotic manifestations. It can consist for instance of a verbal act of story-telling (diegetic narration), or of gesture and dialogue performed by actors (mimetic, or dramatic narration)." (Ryan, 2001)

The above definition takes a traditional communication theory approach to narrative. Under the OOIC model, the interactive film presentation would be the signifier, and the resultant story that comes out of the user interaction, the signified. A random interaction with a film object database would probably not produce a very meaningful narrative, however, and so the concept of narrative needs to be further defined.

Mieke Bal in *Narratology: Introduction to the Theory of Narrative* defines a narrative as containing an actor and a narrator, a text, story and fabula, and that the plot should consist of "a series of connected events caused or experienced by actors" (Bal, 1985, p.8). This definition may be slightly too narrow for the purposes of the OOIC model, but it does bring up the point that for a narrative to be meaningful, it needs to make sense to the reader. This is commonly achieved through solid causality.

"Narrative representation must be thematically unified and logically coherent. Their elements cannot be freely permuted, because they are held together in a sequence by relations of cause and effect, and because temporal order is meaningful." (Ryan, 2001)

This definition tells us that in order for a narrative to be meaningful, it must consist of logically sound cause and effect relationships. I would agree with this for most cases, except for experimental filmmaking, where the artist may, in fact, desire a lack of logic or cause/effect dichotomies. In this case, I would argue that the experimental filmmaker is still producing a narrative, although one outside of conventional definitions. What this implies is that on some level, anything can be considered a narrative, whether it is logically coherent or not. It really depends, of course, on the reader's interpretation and experience of the work. This makes it difficult to set up rules for the construction of a meaningful narrative for interactive cinema. The best that can be accomplished is for the author to make his/her intentions speak through the work itself. If an artist is trying to construct a multi-linear film using the object-oriented interactive cinema model, then it should be apparent in the work itself whether or not the narrative is attempting story development through logical cause/effect relationships.

A last point on the meaning of narrative is that we need to realize that a narrative constructed from a book is different from a narrative constructed from a movie, and we need to evaluate each according to different criteria of what makes a meaningful narrative. Some types of narrative may work better in a specific medium, as becomes painfully clear when a book is poorly adapted for the movie screen (or vice versa). The real question in the context of object-oriented interactive cinema is which types of stories are suitable for digital media?

II. Multi-Linear Narrative:

In her book, "Hamlet on the Holodeck," Janet Murray discusses the properties and aesthetics of digital environments. In doing so, she describes a set of parameters that can be used as a framework for analyzing multi-linear narrative works. Murray's four properties of digital environments are that they are: 1) Procedural; 2) Participatory; 3) Spatial; and 4) Encyclopedic. Murray's three aesthetic pleasures of digital environments are: 1) Immersion; 2) Agency; and 3) Transformation. ([Murray, 2000](#)).

Properties of Digital Environments:

Digital Environments are Procedural:

In order to have coherency, digital environments have sets of rules that govern a user's experience. These rules are not meant to impose limitations, but rather to provide structure to what could otherwise be a chaotic digital landscape. The nature of digital environments is to allow for exploration of new possibilities and creativity.

*"[T]he computer can be a compelling medium for storytelling if we can write rules for it that are recognizable as an interpretation of the world."
(Murray, 2000, pg. 73)*

Digital Environments are Participatory:

Even though we are forced to work within a specific set of rules due to the procedural nature of digital environments, they are still quite appealing to us because of the power they imbue to create new experiences. Participation in a digital environment means that the computer is in some way responding to the user – the program is not just displaying what the user inputs, but interacting. Murray uses the computer game Zork as an early example of a participatory story:

"Within Zork's fantasy world, players move through dungeon rooms by typing in navigational commands..., look for objects that can be manipulated..., solve riddles, and fight off evil trolls." (Murray, 2000, pg. 74)

Digital Environments are Spatial:

"The computer's spatial quality is created by the interactive process of navigation." (Murray, 2000, pg. 80)

Unlike books or print, digital realms have the ability to represent a space that can be navigated by the 'reader.' A multi-linear work with open architecture means that the virtual space is free to be explored by the end-user – there are no specific boundaries guiding the user in a particular direction. Closed architecture is more or less the opposite of open architecture, in that the end-user is forced to navigate a specific path. If the user deviates, obstacles and cul-de-sacs are used to bring the user back to the main path.

Instead of the word spatial, Lev Manovich uses the term *navigable space* to refer to 3-D computer-based virtual space in *The Language of New Media* (Manovich, 2001).

Digital Environments are Encyclopedic:

Digital environments are able to store vast amounts of information. This property is similar to stating that digital environments use a database form. In computer science, a database is defined as a structured collection of data, or an organized body of related information, and in digital media, the database has emerged as an effective medium to provide a user efficient access to information (Manovich, 2001, p.215).

"... creating a work in new media can be understood as the construction of an interface to a database." (Manovich, 2001, p.226)

There are many different types of databases – hierarchical, network, relational, object-oriented, etc – and they each use different models and algorithms for organizing the data. The OOIC model uses an object-oriented database, which stores complex data structures (objects) in hierarchical classes. An object of one class can inherit properties from classes higher than it in the hierarchy.

Spatial (navigable space) and Encyclopedic (database) are the two central properties of digital environments used in the Object-Oriented Interactive Cinema model.

Aesthetics of Digital Environments:

Digital Environments are Immersive:

"The experience of being transported to an elaborately simulated place is pleasurable in itself, regardless of the fantasy content. We refer to this experience as immersion." (Murray, 2000, pg. 98)

One thing that interactive narrative attempts to accomplish is the active creation of belief, rather than just the passive suspension of disbelief.

Digital Environments can build Agency:

"Agency is the satisfying power to take meaningful action and see the results of our decisions and choices." (RefMurray, 1, pg. 126)

Digital Environments can be Transformative:

Transformation can happen two ways: the interactor can transform the digital environment, or the digital environment can transform or influence the interactor.

Immersion and agency are the two central aesthetics of digital environments that the Object-Oriented Interactive Cinema model attempts to effectively employ.

III. Why be Interactive?

Interactive media is often perceived as an externalization of the mind, of making one's cognitive process a part of the public knowledge domain. As users we enjoy interactive experiences because, if done well, they give us a heightened sense of agency by allowing us to customize our experience.

"The very principle of hyperlinking, which forms the basis of interactive media, objectifies the process of association, often taken to be central to human thinking" (Manovich, 2001, p.61)

A major problem with interactive media, however, is that the more interactive the content, the more labor required to create it. A media object with very limited interactivity can actually be less satisfying than had it had no interactivity at all, for hyperlinking is essentially asking the user to follow a set of pre-programmed subjectively existing associations. With a minimal amount of interactivity, the programmer's mind is exposed, thus making it harder for the user to mistake the programmer's cognitive processes for their own. This is thus an argument that interactive media should be

extensively interactive or not interactive at all (in which case it is up to the user's imagination to go beyond the embedded content).

Interactivity does not have to be limited to hyperlinking, of course. Interactive media can involve the capturing and interpretation of body movements, gesture, light sources, proximity sensors, etc. The key obstacle with this kind of "physical" interactivity is how to effectively capture the user's input and then appropriately and intelligently interpret the signals to produce a meaningful experience. This is one of the goals of the OOIC model.

IV. Interactive Narrative:

It is often considered that one must sacrifice narrative for increased interactivity, or that one must give up some interactivity to preserve effective narrative. But does the lack of linearity diminish the effectiveness of a narrative? Proponents of hypertext do not believe so:

"In a hypertext environment a lack of linearity does not destroy narrative. In fact, since readers always, but particularly in this environment, fabricate their own structures, sequences or meanings, they have surprisingly little trouble reading a story or reading for a story."
([Landow, 1997](#))

Expanding the Definition of Narrative:

Perhaps the first step in determining what an interactive narrative is, and how one can be effectively created, is to expand our idea of narrative. The traditional Aristotelian narrative arc of set-up, complication, development, and resolution, need not be completely disregarded, but perhaps we need to start looking at the arc in a different way. An oblique strategy. Instead of an overarching narrative arc that encompasses the entire story and experience, maybe a multi-linear narrative needs to employ micro-narrative arcs contained within story fragments for it to be effectively constructed.

Some common approaches to interactive narrative:

1. Branching narrative - The story follows forking paths based on user interaction. Also called *branching-type* interactivity or *menu-based* interactivity. In this case the information used by the computer program to create interactivity is based on the user's cognitive process, rather than body position, gesture, etc. Because of the exponential process involved in creating a branching-type narrative, projects that employ this type of design tend to be limited in their scope of branching paths. While this may work decently with hypertext or *Choose-Your-Own-Adventure* novels, it is not generally considered a good approach for multi-linear visual media ([Davenport, 1997](#)).

2. Exploratory narrative - The user explores a virtual world, discovering narrative fragments as they progress, to gradually re-construct the whole story in their mind.
3. Generative narrative - The premise behind generative or automatist storytelling is that the structure of a story can be an emergent property of the interaction of the individual with a decentralized storyteller system.

Chris Crawford ([Crawford, 2000](#)) discusses narrative and interactivity using the concept of "flow" to refer to the number of choices that are available to the end-user. The number of possible avenues open to pursue determines if the flow will be branching or linear. How many paths is the user allowed to choose from while navigating the interactive work? As Crawford asserts: "One way to judge the interactive quality of a design is to examine the ratio of accessible states to conceivable states" ([Crawford, 2000](#)). In making a tree diagram of the possible paths available to the end-user through the narrative, a more interactive work would be "bushier" by having more branching paths, and thus more choices.

The concept of embedded versus emergent narrative, which is analogous to Janet Murray's open versus closed architecture (see *Digital Environments are Spatial* above), is mentioned in Eric Zimmerman's article "Against Hypertext" ([Zimmerman, 2001](#)). An embedded narrative structure means that the content is pre-existing; no new content is created during the user's interaction that is outside of the non-linear narrative's program. Here the world is finite and there are a quantifiable number of possibilities available to the end-user. In an emergent structure the rules and procedures of the non-linear narrative allow for unexpected user experiences and content. The world is not finite, and the end-user is able to, at least to some degree, co-construct the narrative. In this scenario the end-user can actually choose not to follow the narrative spine at all, but rather define a personal set of goals. There is a near-infinite number of possibilities available to the end-user. Examples of this kind of emergent narrative environment can be found in Massive Multi-Player Online Games (MMOG), where players can choose to follow the established storyline, or create their own adventures and goals.

In the Object-Oriented Interactive Cinema (OOIC) model, narrative is constructed interactively and in a multi-linear fashion. The narrative can be understood as a pseudo-generative path traversed through a multimedia database of film objects, meaning that while the narrative architecture may not be completely emergent, it has enough variability to appear so.

"An interactive narrative (which can be also called a hypertext) can then be understood as the sum of multiple trajectories through a database." (Manovich, 2001, p.227)

As discussed in Part 1: What is Narrative?, however, an arbitrary path taken through a multimedia database, giving an arbitrary sequence of database objects, does not necessarily constitute a narrative.

"It is simply not possible to construct a coherent story out of every permutation of a set of textual fragments, because fragments are implicitly ordered by relations of logical presupposition, material causality and temporal sequence." (Ryan, 2001)

This is why it is so crucial to have effective algorithms that can construct meaningful narratives out of the interaction of the user and the computer. Effectively merging database and narrative will be an important step in the development of new media, for "a database can support narrative, but there is nothing in the logic of the medium itself that would foster its generation" (Manovich, 2001, p.228).

"Given the dominance of the database in computer software and the key role it plays in the computer-based design process, perhaps we can arrive at new kinds of narrative by focusing our attention on how narrative and database can work together." (Manovich, 2001, p. 237)

Interestingly enough, cinema could be considered to already be at the intersection between database and narrative. During filming, far more footage is captured than will ever be used in the final movie - this raw footage could be seen as a database of film. The editor then uses this database of raw footage to construct a unique trajectory, that which will become the completed movie. We have already seen how different trajectories can be followed, for movies are often re-released with different versions (a so called "Director's Cut," for example, or a "cleaned-up" version for television). When DVD's are made they usually contain a special features section which often includes outtakes, deleted scenes, and other footage that did not make it into the theatrical release.

V. Types of Interactivity:

Lev Manovich refers to the interactivity that uses fixed elements arranged in a branching structure as *closed* interactivity; interactivity where both the elements and the structure are generated dynamically in real-time based on user interaction he calls *open* interactivity (Manovich, 2001, p.40). These concepts are similar to the open/closed and emergent/embedded narrative dichotomies mentioned in Part IV: Interactive Narrative.

Marie-Laure Ryan, in her essay "Beyond Myth and Metaphor," breaks the open/closed interactivity dichotomy down even further (Ryan, 2001). Ryan sets up two pairs of opposing concepts: internal/external interactivity, and exploratory/ontological interactivity.

- In internal interactivity "the user projects himself as a member of the fictional world" (Ryan, 2001). This can be done through an avatar, or by experiencing the world from a first-person perspective (ex. a first-person shooter video game). This is a form of personal perspective interactivity.

- In external interactivity the participant is situated outside of the virtual world, either by playing a god-like role looking on and controlling from above, or by navigating a database-like story structure. This is a form of impersonal perspective interactivity that does not require a concrete persona.
- In exploratory interactivity the user is free to move about the virtual world, exploring all the details, but their activity does not affect the overall plot in any way. The user simply reveals the story as they explore.
- In ontological interactivity the decisions of the user can affect the plot, such that the story develops from the user's interactions.

Cross-classification of these two dichotomies leads to four combinations for categorizing interactive works. These are not listed in any particular order of effectiveness.

1. **External/exploratory interactivity:** Certain “classical” hypertexts fall into this category, such the "novels" of Michael Joyce, Stuart Moulthrop, or Mark Amerika. The user can choose paths through the virtual space, but the space itself has no physical narrative setting. This type of interactivity is exploratory because “the reader’s path of navigation affects not the narrative events themselves, but only the way in which the global narrative pattern... emerges in the mind” (Ryan, 2001).
2. **Internal/exploratory interactivity:** In this category, “the user takes a virtual body with her into the fictional world, but her role in this world is limited to actions that have no bearing on the narrative events” (Ryan, 2001). Even though the user cannot affect the plot, she is still immersed in the narrative through a virtual body. She is present on the story’s stage, if only as an observer. Examples of this type of interactivity are the computer games *Myst*, *Tomb Raider* and *Final Fantasy*. In these games the user plays an internal role (ex. Laura Croft in *Tomb Raider*), but the game is structured in such a way that the user must follow a fairly linear narrative path. Deviating from the "correct" path simply stalls the narrative; the story does not progress any further until the user solves the puzzle/obstacle/mystery.
3. **External/ontological interactivity:** In this category the user is outside of the virtual world, but has some control over the story and the fates of the characters, such that the story is generated directly through the user's decisions. Typically in this case, because the user is external to the narrative, "the individual forking paths in the plot are... less interesting than the global pattern of their interconnections" (Ryan, 2001). Computer games that follow the god approach to user interactivity usually fall into this category (ex. *Black & White*, *SimCity*, *the Sims*, *Caesar*), where the user plays an omnipotent being controlling the world's destiny. Most (if not all) of these games attempt to immerse the user a little more by giving them a role to play in the game. For example in *Caesar* you play a Roman Emperor governing your city, in *SimCity* you are the mayor. In *Black &*

White you are a god fighting for power against other gods in the same world as you. This internalization of the user's role places these games somewhere between external/ontological and internal/ontological.

4. **Internal/ontological interactivity:** In this category the user is internal to the narrative, and has the ability to control their own fate by making decisions according to the laws of time and space of the virtual world. If the Holodeck of the Star Trek universe was ever to be implemented, this is the category under which it would fall. This category is actually quite broad, however, as the series of *Choose-Your-Own-Adventure* books that were popular a few years back is also an example of this type of interactivity. Reading these books, the user flips through the first-person text to follow a branching-type narrative, and ultimately governs the path that they will take through the different narrative possibilities. A good example of this type of interactivity that is popular today is the Massive Multi-Player Online Game (MMOG), where thousands of players interact over the internet in a shared virtual world. Players are actual characters (represented by avatars) who travel around and explore the fictional realm, and who can either choose to follow the inherent storyline established by the game creators, or diverge from this and create their own set of goals and activities, thereby creating a completely generative narrative. In one MMOG, a group of players got together and instead of following the established game quests, decided to create their own club (actually called a guild) with no other purpose than to socialize with each other. For these people, the narrative experience emerged from their own interactions and relationships.

I believe that Ryan's four categories of interactivity are very useful, although I do have a problem with her treatment of ontological interactivity. According to Ryan's framework, a branching-type narrative that has a fixed, and often quite limited, number of possible paths can be in the same category as the Holodeck model, where the experience is completely generated through user interaction, and there are no fixed traversals through the narrative content. For this reason I believe that *ontological interactivity* needs to be broken down ever further, into **embedded ontological interactivity** and **emergent ontological interactivity** (borrowing from Eric Zimmerman's terms). Under this framework a *Choose-Your-Own-Adventure* book would be an example of *internal/embedded ontological interactivity*, and a Massive Multi-Player Online Game would be an example of *internal/emergent ontological interactivity*. An example of *external/emergent ontological interactivity* would be games like the *Sims*, *SimCity*, and any other god-game that has a virtually unlimited number of possible narrative paths.

Interactivity in the Context of OOIC:

The Object-Oriented Interactive Cinema model is more of a system or framework for interactive cinema composition than a particular type of narrative or interactivity. This means that using the OOIC model an author could create a work that employs either a very closed or very open interactivity architecture. Outlined above are various categories for interactive works, all the way from external/exploratory (closed)

interactivity to internal/emergent ontological (open) interactivity. Using the OOIC model, I believe that an author could create a work in all but the internal/emergent ontological category. This means that the external/exploratory, internal/exploratory, external/ontological, and internal/embedded ontological categories are all possible. Because the OOIC model uses film objects of pre-recorded material, it is not designed to produce emergent narratives.

The key concept behind making all of these options possible is that in the OOIC model, each film object has a set of weighted probabilities attached to it which determine what film object gets played next (typically in response to user input). These sets of probability tables are equivalent to drawing relationships between all of the film objects in the OOIC database. This means that if an author chooses to have a limited number of probabilities, the piece will be more on the side of branching-type interactivity (embedded ontological interactivity). If, however, the author creates a very complex matrix of film object relationships, with a certain amount of controlled randomness built-in, the piece would be more on the side of generative narrative (emergent ontological interactivity). The more complex the probability tables, however, the more difficult the task of producing a meaningful interactive narrative.

VI. Examples of Interactive Cinema:

The purpose of this section is to compare some existing examples of interactive cinema with the Object-Oriented Interactive Cinema model.

HyperCafe:

Researchers at the Georgia Institute of Technology created an interactive cinema piece called HyperCafe which was an experiment in what they call hypervideo. The program placed the user in a type of virtual cafe, where they could explore different scenarios.

"HyperCafe allows the user to follow different conversations, and offers dynamic opportunities of interaction via temporal, spatio-temporal and textual links to present alternative narratives." (Sawhney et al., 1996)

In the paper the authors define some terms which I believe are approaching some of the concepts in the Object-Oriented Interactive Cinema model.

1. "Scene: The smallest unit of hypervideo, it consists of a set of digitized video frames, presented sequentially" (Sawhney et al., 1996).

This concept of a 'scene' as a distinct unit approaches the idea of a 'film object' in the OOIC model. In the HyperCafe project, however, it was assumed that "video frames carry with them an audio component recorded concurrently with the video frame" (Sawhney et al., 1996), whereas in the OOIC model this is not assumed – the video and

audio components can be treated as separate film objects, one belonging to the class 'video' and the other to the class 'audio'.

2. "Narrative sequence: A possible path through a set of linked video scenes, dynamically assembled based on user interaction" ([Sawhney et al., 1996](#)).

In the OOIC model, the video scenes, which are film objects, are linked through a database of film objects that have described relationships to each other. The film objects are then dynamically assembled based on user interaction. In the HyperCafe project user interaction was captured via mouse clicks and buttons; in the OOIC model user interaction is not limited to the standard form of interfacing with the computer – in fact, my research in OOIC is looking at live video capture and analysis of the user and their environment (see the description of the Re-Waking Life installation below).

3. Temporal and spatio-temporal links.

Essentially these consist of defined relationships between different scenes based on either a specified time pattern or spatial location. In the OOIC model, these would be seen as operations that can be performed on any of the film objects. The set of operations that can be applied to the film objects make up the rule-set or algorithms that govern the flow and interactivity of the interactive movie. In the HyperCafe project, for example, the authors established algorithms that permitted decisions based on (1) random processes; (2) the number of previous visits to that scene; and (3) whether or not the user had previously visited other scenes in the hypervideo space ([Sawhney et al., 1996](#)).

Other ways in which the HyperCafe model treats movie clips as film objects in a database is that, inherent to their construction of scene connections, the narrative sequences could share scenes. In the OOC model a film object can be accessed and played in any order (as defined by the algorithms governing the narrative) and any number of times, even composited on top of itself if the author so desires. Another interesting point about HyperCafe is that the authors mention how even though the content of a film object remains the same upon each narrative construction, its meaning can change based on its context. For example, a film object that gets shown near the beginning of the narrative sequence can have significantly different meaning to the same film object shown near the end of the narrative sequence. Purposefully giving a film object the flexibility to have multiple meanings based on context brings up interesting concepts around composition for a multi-linear narrative.

A last point of HyperCafe is that the authors bring up the idea of a user being able to save their narrative sequence "should they wish to return to the program and recover, replay, or rewrite those encounters" ([Sawhney et al., 1996](#)). With this ability, users could relive a narrative sequence that they found particularly interesting and enjoyable, although the experience would be changed upon re-viewing since interactivity would no longer be a component of the narrative construction.

Movies of the Future:

The basic concept behind the "Movies of the Future" project at the Interactive Cinema research group at MIT is to "take a computer, infuse it with a detailed database of information about a story, and then let the computer present the story to the audience in its own way" (Beachem, 1995). This approach is very much on the generative side of narrative composition.

"The storytelling computer - responding to the background, interests and preferences of its audience - decides what images or sounds it wants to use in the presentation. It allows the story to take different points of view, choose different characters and scenes, have different pacing and even sets the total running time." (Beachem, 1995)

The "Movies of the Future" project deals with a multithreaded narrative. The authors give Robert Altman's "Short Cuts" as an example of a traditional film that uses a multithreaded storyline. Similar to the OOIC) model, this model also uses a database of images, sounds and music clips that get assembled into scenes. The clips are also linked, such that one clip can be specified to precede another or be included if another clip is included. (Beachem, 1995).

One thing I am unclear on after reading the paper, however, is how exactly the authors are defining a "clip." One interpretation is that a clip is just a piece of information, such as a background, a character, or a piece of furniture in the scene, in which case a scene is generated from an elaborate compositing of all the various factors that go into creating an image. The other interpretation is that a clip is an entire pre-recorded image or sound of a particular length. Either of these are interesting concepts to apply to the Object-Oriented Interactive Cinema model.

Digital Micromovies:

In a paper entitled "Orchestrating Digital Micromovies," the authors "describe how computers can be used to build narrative structures that create simple cinematic sequences from a large database of shots" (Davenport, 1993).

One of their design considerations was that "a viewer should be able to sit back and enjoy the show without frequent interruptions caused by mandatory interactions" (Davenport, 1993). This is an interesting point as many interactive works still employ a "point and click" interactivity which does require input from the user in order to progress through the story.

Similar to other notions of film clip, film object, scene, or shot, the authors define a micromovie as "a short piece of video with descriptive information attached to it which represents a unit of meaning determined by the filmmaker's intent" (Davenport, 1993). The most interesting thing about a micromovie is the information that is attached, like metadata, which the program uses to filter video and make decisions. Using keywords to

describe the fragments of video, the authors were able to use three different filters in their project - one based on dialog, one based on action, and one based on interaction. Finally, the authors also recognize a crucial factor in interactive cinema composition:

"The real challenge for interactive filmmakers is to come up with content that will create a compelling and entertaining experience within the framework of an interactive environment." (Davenport, 1993)

Other Examples of Interactive Cinema:

1. German TV project *Morderische Entscheidung* (1991).
2. *Point-Of-View*. An interactive movie on DVD written and directed by David Wheeler.
3. D-Dag: A millenium project of the Dogma brothers.
4. *The Last Cowboy* - a media art interactive movie.
5. *Lan yue* (1997) by Taiwanese director I-Chen Ko.

"I divided the story into five episodes and devoted each 20 minute episode to one set of things [that]? happen to this trio. In 2,000 feet, I had to finish every episode. The reels can be screened in any sequence, so you'll have five different endings: either the trio walk down the road holding hands, or they separate, or the woman rejects both men, or she falls for one of the two men. 120 versions, 120 possibilities." (Weilberg, 2002)

6. *The Aspen Movie Map* by Andrew Lippman (MIT).
7. *TimeCode* DVD directed by Mike Figgis. On the DVD you can choose which audio stream to listen to, as well as select from other options.
8. Jeffrey Shaw's "The Legible City." The participant sits on a stationary bicycle and uses it to navigate through a computer-generated 3-D representation of a city projected on a large screen. In discussing another of Shaw's works called "Point of View," David Rokeby ([Rokeby](#), 2002) mentions: "The reward... is the unfolding experience of exploration and discovery, the collection of points of view resulting in a personal reading of the work."
9. Myron Krueger, a pioneer in interactive installations, developed a complex set of video-based interactive works called Videoplace. The installation uses a video camera to capture the participant, which the computer interprets as a blob or silhouette and uses to generate a response. The responses are designed so that the body becomes a means of creating art, and the interactions are meant to convey the pleasure of aesthetic creation.

VII. Installation:

The purpose of my installation, called Re-Waking Life, was to explore ideas and practices around object-oriented interactive cinema. It was my goal to produce an interactive digital cinema installation using the OOIC model that asks questions about how the project's format and representation affect an audience's cinematic experience.

Re-Waking Life:

Re-Waking Life was a remake of the animated feature movie "Waking Life" (directed by Richard Linklater) that added interactivity and applied the OOIC model to the film. The OOIC model uses a database of film objects to construct interactive content, and thus, to begin, I extracted the entire "Waking Life" movie from DVD and broke it up into 36 segments, or 36 film objects. These 36 film objects were loaded into a random access database by the computer when the installation was started.

The installation's main component was a large fold-out bed. The original "Waking Life" movie is about dreams, lucid dreaming, dream states, and philosophy, and thus the installation space was decorated in an attempt to complement these themes. For example, there are stuffed-animals toys and a jester hat positioned on the bed pillows, and a cowboy and fireman hat are hanging on the wall.

At the bottom end of the bed was a purple blanket with fourteen felt squares distributed across its surface, twelve blue squares and two green ones. On each of the felt squares a word was written: Dream, Destiny, Life, Philosophy, Experience, Change, Chaos, Society, Freedom, Time, Human, Lucid, and two special keywords, Play and Mix. This blanket with its felt squares and words was the main interface for interacting with the movie that was projected on a screen directly in front of the bed. I called this interface the "dream map."

Positioned above the "dream map" was a wide-angle low-light camera. The image from this camera was used by the computer to create interactivity. The way the interactivity worked is that the interactor used two stuffed-animals – Tweety bird and a polar bear – to create relationship pairs using the words on the "dream map." The relationship pairs were interpreted by the computer to change the movie's content. For example, if one of the toys was placed on 'Lucid' and the other on 'Dream,' the computer responded by changing the currently playing movie clip (a film object) to one where the narrative content was about lucid dreaming. In the installation there were 47 word-pairs programmed into the system. Because there were a great deal more possible pairs possible using the 14 words, I implemented an algorithm to take effect should no pre-programmed pair be triggered. If the user placed the two stuffed-animals on words which did not have a predefined relationship, the computer responded by accessing a table of weighted probabilities and changed the clip according to a probability calculation. For example, if Clip 3 was the currently playing film object and a word-pair was made by the user with no established relationship, the computer looked up Clip 3 in the weighted

probability table and transferred to a new clip based on the probabilities associated with Clip 3. Clip 3 may have had a 30% chance of going to Clip 4, a 20% chance of going to Clip 10, a 20% chance of going to Clip 21, and a 10% chance of going to clip 35. To avoid repeating those clips with higher probabilities, once a clip was played the probability of any clip transferring to it became zero, only to be reset once all of the 36 clips had been played or the algorithm reached a dead-end transition probability (all possible transfers for the currently playing clip were used up). The hope was that using a probability table in this way introduced a bit of randomness to the interactivity, and produced a pseudo-emergent narrative.

The two green felt squares had the words 'Play' and 'Mix' written on them, and indicated special functions. Instead of causing the movie to switch to a particular clip, relationship pairs that were formed with either of these two words caused the movie's visual content to be affected. The 'Play' keyword was used to apply special effects to the currently playing movie. For example, placing one toy on 'Play' and one on 'Philosophy' caused the movie to turn black and white. 'Play' and 'Destiny' caused an emboss effect to be generated, and 'Play' and 'Time' caused the movie to play at twice normal speed. The 'Mix' keyword was associated with collage and split-screen effects. Some relationship pairs caused two film objects to be played side-by-side on the screen at the same time, whereas some pairs caused two film objects to be played layered on top of each other in a two-clip collage. The particular pairs that were made also affected the audio. For example, with one toy on 'Mix' and one toy on 'Dream,' a split-screen effect was produced with the audio heard only from the left-hand film clip; with 'Mix' and 'Chaos,' however, the audio was heard from both clips at the same time.

The interactivity in Re-Waking Life was controlled using Robb Lovell's "EYES" software program and the MAX graphical programming language. The image that the camera captured of the blanket was divided into 14 sensor regions, each one positioned over one of the word-squares. Whereas in the previous installation the threshold was based on light intensity, in this installation the threshold was configured around color values – those of the two stuffed-animals. Thus if the polar bear was moved into a sensor region, the threshold was crossed for detection of a white-colored object, and the computer responded. The actual algorithm was much more complex than this, of course. For example, in order to filter out the movement of a stuffed-animal across one of the sensors when a user was moving it from one square to another, the computer only acted on a crossed sensor threshold if the movement within the sensor region was also less than a velocity threshold (indicating that the user had put the object down) for a given period of time (to eliminate the zero velocity of an object reversing directions). Also, to prevent overly rapid transitions, there was a slight delay between how quickly a new relationship pair could be activated once a relationship pair was successfully chosen.

The concept behind Re-Waking Life was that, as we have control over our dreams when in a lucid state, the user in this installation had control over the movie content (which deals with dream and philosophy) through the playful interface. Word relationships were used to imbue meaning behind the interactivity.

Re-Waking Life was an attempt at creating a multi-linear interactive cinema experience using a database of film objects. Each time a user sat down to experience Re-Waking Life, they constructed a different narrative through the order and manner in which the film objects were juxtaposed together spatially and temporally (spatial and temporal montage). The method and flexibility through which the interactivity was implemented enabled pseudo-generative narrative construction, such that there were literally thousands of different narrative permutations, or paths that a user could follow through the film object database.

The narrative flow was affected by the order in which film objects were presented, which was directly influenced by the relationship pairs made by the interactor. The 'feel' of the narrative was affected by how the user decided to implement and manipulate the visual effects (using the 'Play' square), and how the user decided to combine more than one clip together on the screen at the same time (using the 'Mix' square). Some interesting effects and narrative results could be produced through the spatial juxtaposition of two film objects, either in a side-by-side spatial montage, or in a direct overlapping collage. How was the narrative changed, for example, when a clip of a professor discussing the philosophy of the problem of free will was played concurrently with a clip of an angry man in a jail cell speaking profanities against those responsible for his incarceration? Was the effect different when the juxtaposition was displayed as two clips side-by-side versus as a collage? As per one of my goals for this project, I believe that the Re-Waking Life installation raised many interesting and challenging questions around multi-linear narrative and the interactive cinema experience.

VIII. Conclusion:

In this essay I have provided a working definition for narrative in the context of Object-Oriented Interactive Cinema, and discussed a framework for evaluating multi-linear works. I have attempted to provide an argument for the benefits of integrating interactivity into narrative, and discussed some of the common approaches to composing interactive narratives. The section where I outline the various types of interactivity is an important section because it presents my framework for evaluating interactivity in the context of OOIC. The section on other examples of interactive cinema is also important for it gives some conceptual and social justification for my research. Finally, I provided a lengthy description of my interactive installation 'Re-Waking Life' to demonstrate how I am attempting to implement interactive cinema works under the OOIC model. I still have a great deal of ground to cover, but my hope is that, from this essay, one can begin to see the interesting implications that the OOIC model can bring to interactive cinema and interactive narrative theory.

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