Representation and Action
in the Reception of Myst

A Social Semiotic Approach to Computer Media[1]

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This article is part of an on-going effort to assess and describe the qualitative nature of computer media from a pragmatist, social semiotic perspective. Social semiosis, as the process by which shared meaning is created and contextualized, is the focal interest. Computer media, which are a increasingly ubiquitous set of technologies and applications, provide a timely and challenging subject for communications research. There are a number of previous general semiotic analyses of computers and computer media; the work of Peter Bøgh Andersen (1990), Jens F. Jensen (1990), and Niels Ole Finnemann (1994) are particularly noteworthy. In an attempt to come nearer to the semiosis of computer media, the current analysis presents a close reading of the discourse of a specific application, namely Myst,[2] the popular multimedia adventure game. Three primary objectives are addressed: First, an interest in a detailed specification of what forms and elements are at play in the process of computer mediated worldmaking, as employed in Myst. Secondly, an assessment of the categories of knowledge and action as primary constituents of representation in a social semiotic light, as inflected in the discourse of Myst. And finally, as an extension of the foregoing, a general interest concerning a

specification of conditions for interactivity and an evaluation of Myst in that regard. As such, though the focus is on this specific game, the study touches upon significant aspects of computer mediated communication in general, and exemplifies analytic concepts which are of importance for communication theory in this area.

Myst has been chosen for this study because of both the nature of the game's premises and the rhetoric of its multimedia delivery. In the first case, Myst shares various traits with other contemporary computer-based games, however one of its definitional characteristics is the emphasis placed on the combination of knowledge and action as elements of the game's entertainment. Whereas the computer gaming tradition has produced many action-oriented games, Myst fits very nicely with this study's interest in representation as a form of social action. In the second case, Myst's multimedia delivery demonstrates a self-reflective, if not self-conscious, form of worldmaking. The theme of worldmaking appears at a number of levels within the game, however it is most directly accessible in the enveloping character of the presentation and in the choice of symbols and story elements coded into the game. Before turning attention to the analysis of Myst itself, a discus-

sion of the analytic framework applied in the study is appropriate.

Analytic Framework: Worldmaking, Social Semiosis, and Computer Semiotics

The representational capacity manifest in a multimedia game like Myst exemplifies what the philosopher of art, Nelson Goodman, identifies with the expression "worldmaking" (1978/1988). Games, like art, are meaningful in part because they propose an initial delimitation of a field of relevance. This contextualization is an element of the semantic force which both forms invoke. Games, however, place emphasis on a set of relevant actions and construct the aim of those actions as one of the primary elements of the game's meaning. As such, within the boundaries constructed as "the game", what is rendered is a kind of working world model, a form of conventional meaning which often relies on genre distinctions and contextualizing narratives to orient interpretations and organize action. Goodman's primary interest is in problems concerning truth, representation and the status of symbols in artistic works. Nevertheless, his deliberations are generally relevant for the analysis of complex symbolic constructs. In reconciling concepts like "real", "unreal", "fictive", and "possible" in the face of many different kinds of world-versions, Goodman develops the referential notion of *rightness* as an expression of the relevance, revelation, force and fit of a version (1978/1988: 19). This pragmatic idea of rightness is intended to account for works which are systematically complete but which are externally irrelevant or invalid, as well as the reverse. The idea of rightness as such allows for the distinction between versions, e.g. theories, works of art, and other forms of representa-

tion, which are internally complete but irrelevant or invalid in a larger context and those which may be incomplete or non-representational in themselves but otherwise meaningful in context. As such, insofar as the Myst world is "right", i.e. it "works", is entertaining and engaging, one must ask how is it this world and it's sub-worlds work, how are they constructed in representation. Generalizing from various forms and traditions of discourse, Goodman proposes five primary categories of world variation through which versions of worlds are created or construed.[3] These forms of variation propose a contextualizing genealogy of versions however an analysis of how versions work also must rest upon other more phenomenological observations. Goodman's observation, that various semiotic systems collaborate as the material attributes of conventional signs in a collected productive capacity, is particularly significant for the analysis of multimedia. Goodman points out that, "... nothing is clearer than that music affects seeing, that pictures affect hearing, that both affect and are affected by the movement of dance. They all interpenetrate in making a world." (p. 106) Components of various channels, as a collection of semiotic systems coordinated so as to affect widely nuanced representations, may combine complementary or differently yielding a rich field of impressions. The status of the composite is not static. Given the variety and formative functions of symbols, meanings are far from stable being inherently processual and contextual:

> A salient feature of symbolization, ... , is that it may come and go. An object may symbolize different things at different times, and nothing at other times. An inert or purely utilitarian object may come to function as art, and a work of art may come to function as an inert or purely utilitarian object. (Goodman, 1978/1988: 70)

Thus, in the context of a game, or art for that matter, the temporality of meaning is a significant aspect of its ontology. The rightness of a version is highly contextual, and as such is an exclusively social phenomena. An essentialist question, like what meaning an attribute in the discourse of Myst has, must be qualified by asking when and how that attribute is meaningful in the received discourse of the game. As such Goodman's pragmatic orientation is productively extended into the domain of a social semiotic communication theory, which in the tradition of Peircean semiotics, is meaning defined in relational, processual, and performative terms.

The distinctive features of Peircean pragmatism are specified in three concepts: semiosis, action and difference. In distinction to communication theory based on essentialistic models, one of the most amenable aspects of Peircean pragmatism for the present project is its definition of semiosis as a continuous, re-entrant process. Peirce argues that semiosis is the process of communication via signs of all kinds (Peirce, 1940/1955: 282; Singer, 1984: 42) as a constituent element of all human perception, orienting both cognition and action. Peirce argues that the nature of a sign is such that it produces another which is based upon the interpretant of the first (1940/1955: 100), and so on endlessly, "mediating the interaction between humans and their natural as well as cultural environment" (Jensen, 1995: 11). As such, signs are productive, initiating further processes in which their relevance for action in context is negotiated. Which leads to the assertion that representation of the world is in signs and is itself a form of social action: "an act for a purpose in a context." Thus meaning is relational, not only in terms of discursive difference as pointed out by Goodman, but also in terms of interpretive

strategies applied in the larger contexts of cultural and social structures, with consequential implications for action in a variety of domains. Semiosis on this account provides a ground for clarifying the relationship between discourse, decodings, and the social uses of signs as three stages of meaning: structural, situated, and performative (Jensen, 24f, 28f). In the context of the present discussion, these stages may be exemplified in the following preliminary mapping: First, structural meanings are the range of potential meanings available in discourse, which may derive from multiple systems of signification; in the case of multimedia these include images, animations, sound, text, user input, and non-linear presentational structures based on networks of hyper-links, producing multiple pathways for navigation. Second, situated meanings are indicative of particular contexts and are an aspect of the interpretations through which, in the course of contact with the game, sense is made of the contents of discourse, and further action oriented. Lastly, performative meanings are related to the game as an object, as an element in the discourse of culture and society, possibly orienting cognition and action in a variety of domains. This open field of semiosis is able to account for intertextual phenomena as well as the transformation of symbolic expressions across social contexts and domains of meaning, thus accounting for how specific symbolic constructs become variously nuanced, perhaps achieving Goodman's representational rightness. Semiosis on this account, provides a nuanced model for conceptualizing how, for example, we negotiate the meaning of new media as an element of socially constructed reality.

Meaning, however, as a result of representation, is integrally connected with the notion of consciousness. Pierce repeatedly makes the point in his theory of signs that,

though a sign could be conceived as composed of only two components, that it cannot exist as such. He argues that, integral to the possibility of semiosis, or the being of sign relations as an action or influence, is the sign's representative function: The sign represents an object to an interpretant. A sign is identified by its ability to convey information hence the assertion that the categories of knowledge and action are the constituents of representation. This function of the sign is explained by Peirce via his triadic model of semiosis. According to Peirce, a dyadic pairing never conveys information, and logically does not exist (1940/1955: 100). He cannot demonstrate this materially, which leads to a proviso in this regard, but he is not hindered in an assertion correlating semiosis with the modification of consciousness: "... the interpretant is, at least, in all cases, a sufficiently close analog of a modification of consciousness to keep our conclusion pretty near to the general truth." (1940/1955: 282) Consciousness, then, is the object of representation, and the action of a sign is modification of consciousness. Peirce elaborated three modes of consciousness that, in relation to semiosis, designate Emotional, Energetic and Logical interpretants. Jensen correlates these with feelings, efforts and habit-changes (1995: 29). It is in this connection that representation and action intersect as meaning in a double hermeneutic. Insofar as a representation is integrally connected with the modification of consciousness, action has taken place. However, the action in itself is a further representation, namely the consequences of a feeling, an effort or a change in habit, which in turn orients further action. Consciousness as an aspect of reception has three levels, described by Jensen (1995: 38) as unconscious, discursive and practical. These correspond roughly to repressed or distorted cognitions

or impulses, verbal expressions and the capacity for dialogue, and lastly, a loosely defined middle ground, "comprising a substantial 'grey' area in between focused intentionality and the classic unconscious." The relevance of this differentiation here is that in the discussion that follows, conjectures are made throughout which involve the selection, identification, and elaboration of various systems of signification within Myst. The basis for doing so rests upon a theory of consciousness which correlates the representational aspect of signs with the dynamic aspects of their impact. The meaning of that impact, understood broadly, is signified in a further act of interpretation.

Construed as "the symbol processing machine" (Finnemann, 1994:357), at the highest level of abstraction the computer is characterized by the application of computational resources to the task of collecting, structuring, processing, storing, replicating, transporting, and displaying information rendered in images, sound and other forms representing a vast variety of symbolic constructs. At the most concrete level, the only way to see the work of a computer is to evaluate what it sends back. In its processing, its action is primarily invisible, what appears on the screen or issues from the speakers is a sign, rather, many signs. How that output is evaluated is reflective of further semiosis. Computer media constitute a particular kind of environment for semiotic analysis: On the level of program interfaces, there is communication between user and device which is evidenced in the discourse of programs as their output issues from speakers and appears on-screen as well as in the actions of the user. On the level of discrete applications, communication systems which facilitate interaction between parties, have implications for cultural and social patterns. Both of these ana-

lytical objects rest, in Finnemann's analysis, upon three features inherent in the idea of the computer namely informational notation, algorithmic syntax and redundancy. It is primarily the second feature which is interesting in the current study as it specifies a three part hierarchy of regulated expressions, first- and second-order algorithms. Regulated expressions may be understood as data, and algorithms are the rules by which data is processed. First-order algorithms, being stable routines for handling data, are manipulated by second-order algorithms which function as control structures. As such, the implementation of second-order algorithms is one of the key features of computer semiosis insofar as it allows for dynamic response to explicit variables which represent an unending variety of conditions. In the active reception context of a game like Myst, the player is involved in this discourse of second order algorithms insofar as choices on the part of the player stand as a form of control decision effecting the further progress of the overall process. The degree to which this discourse of choices in the reception of a multimedia work is in fact dynamic is, of course, significant in an assessment of interactivity. Having provided an introduction for the theoretical orientation of the discussion which follows, the remainder of this article focuses on Myst. Beginning with a description of Myst as a computer game, the discussion continues by classifying the discursive elements of the interface as invoked in an actual sequence of game play.

Myst as a Computer Game

Myst is an adventure game for personal computers intended primarily for the home market. The player is cast as an explorer who has stumbled upon the Book of Myst

and must venture into the world it depicts, seeking clues, gaining knowledge about the story of Myst. All of this is animated via images, sound effects, music, and text. The player navigates and makes choices in the Myst world by means of a point-and-click interface which uses the mouse as a pointing device. The challenge of solving the puzzles provides the central motivation for game play, nevertheless a portion of the game's entertainment value comes from experiencing the game world and the realism of its audio-visual presentation. Myst does not have a win-lose orientation, rather the game is finished when the player has found and correctly solved the all the puzzles which yield the secrets of the Book of Myst. Finding all the clues and visiting most of the places in the Myst world can take an extensive period of time. The degree of emphasis on analytic problem solving as the primary game activity is unusual in the tradition of computer games and the animation of this activity in the context of a highly polished multimedia product is novel.

In terms of its inheritance as a computer-based game, Myst displays many of the generic qualities of computer games identified by Sherry Turkle (1984: 58-9). Turkle's presentation of the nature of computer gaming involves a comparison between historically earlier entertainments which were based on mechanical technologies and modern versions which are computer driven. The contrast proves enlightening as she aptly identifies the sociological features of "computational specificity" (p. 60), which represents a categorical distinction between entertainments like pinball and Space Invaders. Turkle uses the expression to indicate a number of the traits of computer games which centers around the logical, rule-based bias of computer gaming; the relative independence of computer games

from limitations of mechanical systems which takes the form of a "more perfect expression of the player's actions" (p. 63); and a culminating abstraction of space which facilitates the synthesis of imaginative identification (p. 79) within the aesthetics of a rule-driven world (p. 77). Turkle contends that the nature of computer gaming is reflective of an orientation of subjectivity relative to what she calls "control over challenge"; rendered on computers as invariant, perfect contests (p. 86-8). Though Turkle's distinctions can be seen to describe computer games in general, it must be pointed out that, though she discusses a range of relevant phenomena, she refers primarily to action-based computer games like Pong, Space Invaders, Pac-Man, and auto race simulations where physical skills are a hallmark. Action games, which constitute the dominant tradition, place a characteristic emphasis on the adroit manipulation of a physical interface system, the collection of points, and so forth. A figurative death as the final symbolic moment of the game is a consistent feature. Adventure games, which distinguish themselves by introducing other aspects into the entertainment including riddles and puzzles place emphasis on the category of knowledge. Many of these games also rely in a high degree on action game features. Myst, while retaining some of the generic attributes of computer gaming which Turkle identifies, otherwise dispenses with many attributes of the action game tradition almost entirely, while amplifying the central role of the category of knowledge.

Like other computer games, playing Myst includes entering an imaginative world, developing a repertoire of strategic responses and reaching an understanding of the game as a reflection of the designers' intents. Contrary to the predominant tradition identified above, where the level of play is closely related to concentrated eye-hand coordination, Myst is an analytic game where the adroit evasion of figurative destruction is not involved. In fact, most unusually, the speed and accuracy of the player's physical reactions are of little importance. Whereas the collection of points and extra lives has been a standard feature of both action and adventure based computer games, in Myst these devices do not appear: There is no score in Myst; the player collects information, but neither points nor reprieves. Furthermore, though there is "evil", there is also no adversary in Myst, which is connected with the fact that there is no mechanism in the game for determining it's end. The player can go wrong, but this is not a reflection of some element or factor in the game which is "actively" working against him. This is in contradiction to what Turkle identifies as an infinite horizon of game play based on the repetition of a perfect, rule-based contest. Myst is effectively "solved" only once and the competitive aspect in Myst, because its based on knowledge and not action, is not particularly interesting the second time around. You can only "get better" at Myst to the extent that you know each of the secrets and can navigate all of the locales found in Myst. Finally, Myst is a kind of game which invites a social aspect that goes beyond observers looking over a player's shoulder. Adventure games in general might be said to include this feature. Myst however, as a lengthy undertaking involving some complex problems prompts collaborative play in a characteristic manner. As such, though I only speak of a single player here, it would not be uncommon for two or more players to gather around the game and approach it together.

Following Turkle's argument, computer games can be seen historically to derive from the arcade-action gaming tradition.

Myst, on the other hand, responds to another context of reception, which is based on the increasing prevalence of advanced computer resources as an element of the social environment of the home. The focus on knowledge over action in Myst, might be interpreted as a response to negative associations concerning action games in general, which often involve explicit representations of violence and destruction. Further, it might be argued that action games are also tainted by the social deviance traditionally associated with arcades on the part of highbrow and religious interests. It would take a different kind of analysis than the one undertaken here to verify such speculation. Nevertheless, it is safe to say that Myst, as a form of multimedia, can be seen as a recontextualization of computer-based gaming in a form agreeable to the market for home entertainment.

The Discourse of Myst

In this section I present a description of the discourse of Myst drawn from a close analysis of an actual sequence of Myst game play. I discuss this example because it affords an opportunity to illustrate certain specific characteristics of the game, it's interface system, and the concrete material which with the player orients himself within the game. The description covers four salient discursive features of the game, namely frames, audio-visual effects, the pointer, and story elements. These elements are significant because of both how they contribute to the aesthetic, worldmaking aspects of Myst as well as and their functional roles in reception.

Frames

The first element which requires attention is what I call a frame. The concept of frame used here is drawn from the standard terminology of multimedia production.[4] In schematic terms, a frame is situated in a sequence or a network of events. Functionally, it serves as a place holder which may contain any one of a number of elements including animations, sound, graphics, player-input, control structures and so forth. Though the concept of a frame is generic, in Myst all frames have a few consistent features: Each frame contains an image, for the most part static, centered on the screen upon a black background. The images are ray-traced, three-dimensional computer graphics depicting the places and objects within the Myst world. They serve both an orientational function and contribute to conveying the characteristics of a location. In addition, each frame includes an invisible overlay which is used to map the location of the player's mouse-clicks to subsequent actions on the part of the game system. All actions within Myst occur within the graphic space of the frame as interpreted through this invisible overlay. These frame elements play a significant role in the collaborative discourse which constitutes the communication between the game system and the player. The frame, as such, serves as the basic unit of topological and temporal order in the discourse of the game. Changes from one frame to another, one location to the next, occur only after the player indicates a choice of action by clicking the mouse in the appropriate zone of the frame. As such, frames are not temporally determined by the system. In transition from one frame to the next, the optimal visual effect is that images within two sequential frames dissolve from one to the next. There are two distinct types of frames used in the Myst game system, which are identified as transport and feature frames in the discussion below. The primary distinction between the two has to do with the

range of actions available to the player within each type.

Audio-Visual Effects

Visually, Myst exhibits a characteristically refined, realistic[5] style through-out. All features in the images are sharp, textured, and rendered in three dimensional perspective. An image production technique called ray-tracing yields a characteristic look which can be observed in the sharp definition of objects as well as the manner in which textures are rendered on surfaces. There is a tactile element which is produced via this imaging technique. Image content has been carefully planned to reinforce spatial realism as well as attract attention to features of a location. Logical continuity persists between frames, though transition between frames may be jerky. The effect is such that as one travels, one "jumps" from one near location to another. This does not compensate for the experience of physical movement in actual space, however a certain degree of realism is maintained, and the logical effect of movement is accomplished. Spatial continuity is constructed via a variety of audio-visual devices. Images in adjacent frames often depict common elements scaled and textured to reflect a change in point of view. Spaces constructed visually via perspective techniques in Myst, actually have a physical dimension in the form of the number of frames and hence the number of clicks it takes to traverse them. The space itself is imaginary, however the nature of the interface is such that common spatial abstractions from experience are easily applied in Myst. Sound is another element which contributes to the experience of Myst. In general, sound effects are used in Myst to strengthen the sense of environment in concert with image content. The sum effect is a heightened sense of

place. There is often a consistent logical continuity in sound effects: While the player is in a particular place, its indigenous sounds are a persistent feature. Music is another important device used for rendering environment and mood in Myst. The presence of music is non-realistic, however, as in film, music works as a connotative device which contributes to the player's impression of a place. Furthermore, aural elements in Myst are also used to delimit a subset of the spatial representation received visually. This is accomplished by altering the sound environment within a locale. This device contributes to the definition of sub-spaces and hierarchies of significance, based not only on topological consistency, but also on the meaning of the space for the success of the player rendered via sound. Animations with coordinatated visual and audio tracks are also a significant element in Myst. These are typically animations of one of two types. Either they are "in-line" components of the image in the frame, meaning that they are aspects of the image which change upon activation, producing a coordinated visual and audio effect. Or, they are complete animations set in characteristic windows in special frames which, for example, depict travel over long distance in the Myst world. Sound in this type of effect is usually a characteristic "travel sound". A typical in-line special effect might be a switch. Such effects are attributes of a frame as they are often constructed via the visual animation of an event without a change of frame occurring. Sound as an aspect of in-line effects, again, extends the sense of realism, functioning as polished highlights which accompany the operation of switches and other devices. This use of sound in special effects serves a few purposes, not the least of which is positive feed-back for the player. Switching results in a "switching" sound. Picking something

up results in a "picking-up" sound. Not only is there a confirmation, but the combination of visuals and carefully chosen sounds adds to the fit of the illusion.

The Pointer

The pointer functions as an element in two kinds of discourse within the game system. On the one hand, it takes the form of an icon which plays a role in signifying the various options for action a player has in a given frame. It often does not indicate the complete range of choices, however it does usually indicate which of the three basic directions of travel, forward, left and right, are available, as signified by the icon in the form of an upward pointing index finger, and a hand pointing to the right or the left. The second function of the pointer, in conjunction with clicking the mouse, is that of representing the will of the player to the game system. It should be noted that one of the defining characteristics of the Myst game system, made explicit via the frame interface, is the finite number of distinct actions the player can take in a given frame. For the most part, the player can make only one action choice per frame. This is a characteristic of transport only frames, as identified above. In these frames the only choice available concerns the direction in which to continue. Transport frames lead to other frames; the player's action can only result in changes of frame. Feature frames, on the other hand, are characterized by an expanded range of choices. These usually involve manipulating objects depicted in the image. Such objects may initially be invisible, appearing as a result of the player clicking on the space in which they are hidden, or operating some device like a switch. Clicks on features do not cause frame change as such, though they may precipitate animation, music, sound effects or the appearance of text. It is notable that there are cases in Myst where action in one frame will effect the status of variables in another. Feature frames can be sub-divided into two types based on the complexity of the objects which are represented, as a function of the number of actions which a player can undertake relative to them. This difference can be exemplified with reference to two types of objects. The first, already mentioned above are simple in-line animations. There is a direct, binary, cause-and-effect relationship between a player action and a audio-visual response of, for example, a door opening. As a result of the player's action, the logical status of the door as well as the relevant part of the image are updated. Complexes of animated objects, the operation of which has larger significance for game play represent the second category of objects depicted in Myst, those which I call virtual interfaces.

Virtual interfaces are complexes of animated objects which work in consort for the purpose of controlling some third element in the Myst world. I call these interfaces because they establish a means for structuring a complex interaction which is focused on manipulating a set of variables. The generic nature of an interface is such that it specifies a set of relevant variables, the range in which they can be altered, the agents which may alter them, the procedure for this, and the subsequent result of so doing. This is true of the Myst interface: There are certain variables, for example, which direction to "move" in next, which are decided by the player, the decision being communicated by mouse click, the computer interpreting the action, and invoking the appropriate frame change. In virtual interfaces this pattern continues to hold true, the distinction is primarily formal. When the player sits at the computer and manipulates the game system, the inter-

face is typically said to lie between the man and the computer and consist of the discourse of the game and the physical means by which the player communicates with the system. However, in the case of Myst's virtual interfaces and the objects they are used to manipulate, the interface is a second-order construct – an interface within an interface – a means for manipulating a set of variables represented via an over-ordinate structure of the same type. An example of this is a certain control panel found in the game. The individual components of the control panel take the form of buttons and the number display. These are simple animated objects. Each button in itself is an object whose method of activation and result are clearly linked. Taken as a whole, however, the control panel device, as a means of acting upon something else, is a comparatively complex construction. In this case, the referent of action on the buttons is clear: Four buttons control the numbers displayed, and the fifth enters that number for evaluation. So, whereas the activation of the buttons is a binary affair – one click correlates with a change in the value of a digit – the interface as a whole is capable of indicating 100 different values. This is a radical increase in information as a representation of possible combinations. The general function of these interfaces in Myst is to guard significant information. Solving for the information which will unlock the puzzles is, of course, the primary activity of the game.

In terms of the actual use of the pointer itself, there are some interesting things to note. For instance, the pointer icon takes no more than three different forms in any given frame. The frame containing the above described control panel is by far one of the more complex in terms of options for player action. In that frame, the number of

possible actions associated with one icon form is six and the number of unique actions available in the frame is eight. The only icon form which ever indicates more than one type of action is the upward pointing finger, and this occurs only in frames where there is an animated object or a virtual interface as well as an option to move forward, past the object. The shifting pattern of signification connected with the pointer icon is reflective of the structure of the relationship between the game system and the player. One might say that the game system "knows" all of the important information about the Myst world, the game being the mediation of the player's success in finding it. It does not responsively block the player in acquiring this knowledge, but it is organized in such a way that critical information is not immediately available. Acquiring familiarity with different spaces in Myst is a basic necessity, as such the game system always cues movement via the pointing finger icon. As it regards all other operable features of frames, the pointer is dumb. In its "silence" it glides over locations in the click map which could otherwise reveal relevant new information for the player: The result of changing the status of a switch or door produces a reaction on the part of the game system which consistently puts the player closer to consequential information or new possibilities for movement. The pointer is the nexus of this aspect of the game. The discourse of the pointer is such that via its changes in form, the game system on the one hand openly encourages movement on the part of the player. While on the other hand, there is a simultaneous silent, closed discourse which dissimulates the points of access to an intersecting system of discrete, significant information. This latter system is repeatedly referred to via the presence of animated ob-

jects and virtual interfaces, and is implied by image features which precisely do not cause the pointer icon to change form.

Story Elements

The story of Myst is a mythic narrative which serves a number of seminal functions in relation to the construction of Myst as a game in the traditional sense. One of the most basic of these is that of establishing and renewing the player's interest and involvement in the game's premises. The discourse of story elements in Myst serves as a foil for the game's cerebral, puzzle solving motives. There is a tension though between the player's engagement in the overt purpose of the game, namely solving puzzles, and the relevance of the Myst story. The story, which is revealed in bits and pieces throughout the player's wanderings, fills out a creation myth about the game world. As such it is the primary cultural artefact of the Myst world and encourages the perception that world as a social setting. Centering on the account of a family's history in the world of Myst, the story conveys the dynamics and psychological drama of this small group. A range of associations with real-world social phenomena are indicated as the player is encouraged to identify and empathize with the figures in the story. For example, there is a repeated passionate appeal made to the player that he understand that his actions will factor in the future of the Myst world. Through this appeal the player is encouraged to engage the game at the level of the myth, investing his actions within the game with meaning relative to that story. The creation, population, and present state of the Myst world, as well the motivation for the player's puzzle solving activities, are contextualized and attributed a valorized meaning via the Myst story. That narrative, however, competes with an-other which reflects the player's interests as constituted via his reception of the game. The non-linear nature of the medium is, in part, responsible for amplifying the significance of this player-oriented story. In a linear narrative, the text represents a fixed sequence of events; the audience has no capacity to influence the course of the plot. In the case of multimedia, where the user typically has some control over event sequence, story reception takes place under another set of conditions and expectations. This is not to say the player necessarily is granted the capacity to influence the course of the plot or change anything about the story itself in Myst. On the contrary! In Myst, the story does not at all respond to input from the player, only the order in which the previously established features of the story are revealed changes. A consequence of this is that one can engage Myst even though one has a minimal interest in the story being told in the background. Solving the puzzles, like searching for the grail, can in itself be a sufficient source of interest. Nevertheless, while seeking to solve the puzzles, the player will come in contact with the story as a matter of course. One way the story reinserts itself as a factor in the game is in it's function of narrating the puzzles. This equates with giving them social, contextual meaning, which itself occasionally serves as source of clues. The creation myth is an essential part of accomplishing this: Myst responds to this independence of the player by structuring the revelation of the creation myth in such a way that it feeds into the player's own narrative, shifting the basis of fictional representation from story telling to ethnographic exploration.

Giving visual form to the contrasts between linear and non-linear narrative is not unproblematic. Perhaps this is the primary message in the game designers' ironic choice of the book as a recurring symbol in

Myst. Animations of tattered, time-worn, leather-bound volumes are used thematize three visions of the book: First it is a symbol for the world of Myst itself, laid open to be read or uncoded. Second, the book as a source of a source of information about the world and its puzzles. And last, the book is also a form of confinement. The first case is the first the player meets: The beginning of the game is designed such that the player enters the Myst world by clicking on the image of a venerate, time-worn tome. Doing so transports him to the imaginary world of Myst. From the player's point of view, either he enters the book, or the world of the book begins to unfold before him. In combination with the sound track, there is a certain suspense generated by this performance, in which the electronic book is an animate object. In the second case, the image of the tattered volume is connected with knowledge about the world focusing primarily on the player's puzzle-solving interests. In this context, the book image reveals the hand-written journals of the "creator" of the Myst world. These journals are a factional element of the fictional world: They serve to provide the player with a range of information, some of it useful for puzzle solving. An intriguing part of the story told in the journals, is that the written production of the journals is the modus operandi of the world's creation. The figure who shaped the Myst world literally wrote it into existence in his journals. The journals represent a potent tribal lore, which as, it fades and is destroyed, changes the "physical" world of Myst itself. One cannot help but draw associations both with Biblical stories, nor overlook the fact that the game world of Myst is "written" into existence as a computer program and read again in the reception of the discourse of that program. In the third and final case the time-worn tome is a symbol of confine-ment. In connection with the theme of de-struction, one of the sub-plots in which the player is invited to engage concerns a pair of characters who have been confined within two books. Both of these characters pleas with the player to release him, and not the other. The premise is that one of these two characters, in fact they are brothers and sons of the creator, is evil and has been party to the destruction of his father's journals, and thereby destruction of the world of Myst. This device is one of a few which provoke moral and ethical deliberations on the part of the empathetic player. The construction of this tension between creation and destruction, good and evil, and its impact upon player in terms of his understanding of his identity and purpose within the game comprise the primary object of the discourse of story elements in Myst.

Knowledge

As discussed above, the category of knowledge in the reception of Myst is underscored by the exploratory posture in which the player is cast, as well as the puzzle-solving nature of his goal. It is further reinforced by the lack of other diversions, such as adversaries, points, and the threat of figurative death. Aside from admiring the construction of the world of Myst, the knowledge-based premises the game sets forth prevail as the primary alibi of the game's entertainment. Discerning the topological features of the Myst world, solving the puzzles with which he is faced, and conceptualizing the game as a whole are all integral components of game play. Related to this experience of the game, it can be expected that the player will form certain characteristic kinds of representations of the Myst world as a product of his engagement with the game. This section presents a typo-

logy of these kinds of representations as reflections of the basic kinds of knowledge the player can be expected to develop in the course of game play. This typology is not exhaustive, nor does it attempt to specify the exact content of each category, however it does respond to the game as a presentation, it's premises, and it's status as a token or object. Though subject to much debate, research in cognitive psychology suggests that representations can take a number of forms: They can be either external, i.e., pictorial or linguistic, or internal and mental. Internal representations are either symbolic or distributed. Symbolic representations are further subdivided into analogical and propositional types. (Jensen, 1995: 176, citing Eysenck, M.W., & Keane, M.T. (1990). *Cognitive Psychology: A Students Handbook*. London: Lawrence Erlbaum.) This hierarchy serves to distinguish representations into kinds with a certain range of characteristic attributes. It allows for certain basic distinctions which, as applied here, indicate that the first two kinds of representation significant in the reception of Myst are symbolic. The first of these consists of analogical mappings of the Myst world. The second, reflecting the correlational efforts of the player in his problem solving activities, is propositional. The third kind of representation is more problematic because it is actually compound. It responds to the game of Myst both as an object of manipulation, which indicates the knowledge the player acquires to "operate" the game at a number of levels, as well as the game as an artefact in the discourse of everyday life. The representation of the game as a whole, as an object of manipulation and as a discursive element in further semiosis, are two sides of the same coin. These three forms of representation are discussed here under the headings of mapping, correlations, and the game-as-object.

Mapping

Mapping is an on-going activity which has three primary phases, namely identification, orientation and prioritization. Mapping is a result of considering the Myst world as a geographical construct. It includes both the development of topological representations of the Myst world as well as strategic diagrams, perhaps of nodal features within the clusters of frames which define locations. In both cases, one expects the actual symbolic units which a player establishes to be individual knowledge. However, the logic of spatial realism in Myst and the relatively finite knowledge-base required to solve the problems set forth in Myst, one can expect various levels of mapping to factor in a player's understanding of the game. Focusing on the topological version of this kind of knowledge a scheme of relations can be found which differentiates locales and nodes. Within this scheme, a locale identifies a cluster of frames which, via their audio-visual content, indicate a logically bounded space. A particular place, like a plaza or a room, would be a locale. The idea of a node, on the other hand, indicates the priority of some frames within a locale over others. Frames featuring animated objects, virtual interfaces, and egresses will probably figure more prominently than frames used as spatial place-holders or those which contain devices deemed uninteresting. Frames of the former type, once located and identified, have a strategic value for game play. Frames of the latter type, after they have contributed to a sense of space, cease to factor in game play and can actually be eliminated via the game's "zip mode". The locale-node scheme may also be transferred to an understanding of the collected network of locations in the Myst world: Some locales are more important than others because they may contain a

concentration of significant features and thus take on a higher strategic significance. Thus, in the player's mental representation of the topological features of the game, not only is a network of locales established but these locales and the nodal points within them have a relative weighting which may change in the course of game play. In general, these representations are iconic in nature. They constitute diagrammatic representations of the relations between features in the Myst world.

Correlations

Representations in the form of correlations are indicated by the propositional character of the puzzles located throughout the game. Operation of the control panel described above exemplifies this kind of knowledge. The correlational aspect can be illustrated via a statement like, "The interface (the control panel) + some information (input) = a result", or, better yet, "The interface + the right information = a clearly correct result, in the form of more significant information, which applies in yet another context of play". The player's problem is to find and correlate the information he has with the puzzle devices distributed throughout the game. Correlational representation is based on an indexical sign relationship. It involves the association of the features of the problem with the form of the information available. One refers to the other and vice versa. Aside from the splendour of the multimedia presentation, and the mythic story, the game is organized in such a way that denied gratification fuels player interest. There is a delay of gratification as the player engages in second activities before being prepared to return to enter key information necessary solve the puzzles he encounters. This is the kind of build-up around which the game is organized: Pieces of in-

formation which lead to other pieces of information, usually via circuitous routes. Though there are a number of paths which a player can follow on his quest to collect these, there is a finite set of well marked nodal points at which they lie. These locations are highly marked and usually the player knows when he's found something he's "supposed" to find. The nature of indexes is such that, as Peirce points out in his typology of signs, they focus attention (1940/1955: 108). Special features such as music, iconography, and written description are examples of some of the means by which a significant piece of information is signalled. In the case of puzzles, depending on the form of the puzzle, the prize solution results in an animated event, such as the opening of a door which previously would not budge.

Game-as-Object

The game as an object indicates to two sets of interrelated understandings, namely the game seen as a closed world representing it's own discursive features and the game as an element in external discourse, representing the game as a social object. Heiddegerian formulations like "the world of the game" and "the game in the world" suggest the distinction which is being drawn. In both cases a common practical unit, the game, is postulated. In the first case, the unit is seen as parts which are internally related. On the other hand, the unit and it's components are elements in a number of discourses in which their external relations and the significance are contextualized and negotiated. Thus, operational understandings of the game and the game system as a consistent, rule-driven, utilitarian construct are examples of the first case. This knowledge reflects how well the player knows the features of the game system and is able

to manipulate the game's controls in achieving his ends in the game. Knowledge of this kind includes skills, abilities, and other forms of enacted manipulation of the game as a physical and logical system. Insofar as actual mappings and correlations are formulated by the player, they are also examples of this kind of knowledge. On the other hand, the game as an object is also a discursive fact in a wider perspective. This is the game as it is rendered as a social object; discussed, referred to, exemplified and cited. As an example of how these to levels interrelate, take, for example, a player's knowledge of a special feature or secret within the game. As knowledge about the circumstances of a feature of the game, it may help the player in a number of ways including solving a puzzle and formulating a better understanding of what to look out for. On the other hand, as the player's discovery of this feature might be interesting to his friend who is also playing, knowledge of this the feature may become an element in their interaction, and in being shared may function as a token reaffirming their friendship. As such knowledge of the game-as-object may orient action within the game, and also be a significant element in other domains.

Semiotic Action

Computer media are characterized by their explicitly semiotic nature. They constitute a supreme technology for the manipulation of representation. Computer interfaces are primarily devices for representing and manipulating a wide variety semiotic systems. For example, one might say that the wonder of Myst is related to the simulation of transport in space which it creates. Considered logically, there is no movement occurring, rather there is an effect based on a clever orchestration of the machine's output de-

vices and the player's cognitive apparatus. The space represented is not real in material terms, but the player's experience is easily expressed in everyday formulations like, "I left one room and went to another." There is a chain of semiosis which involves the game as a complex representational system orienting the players action. This is an aspect of the intentional nature of the semiotic system which refers to the work of the game's designers. Only in a euphemistic sense can this communication be called dialogue. The obligation of the designer is to deliver a clever anticipation of needs and interests of the player. The player engages the received premises of the work and formulates an understanding of the intentional set of the designers. The game as such is a limited, active sign. It stands in for a number of relations and conveys a number of it's own, which are the basis for it's identity, however it is highly restricted at the level of interaction. For example, the game system does not understand rage due to the player's lack of a solution to a particular puzzle. Neither does it register the player's clever discovery of advantageous knowledge. Further, it has no means of altering the content of the story-line based on the player's actions. However within certain boundaries, that is insofar as the player identifies "meaningful" ways to act with regard to the system, e.g., he develops representations of the game-as-object in a material sense, there is a form of communication which occurs between the player and the game system. This communication is organized around the player's representations of the game, and consists of the player's continued experiences and ongoing recognition of, judgements about, and learning relative to the game both as set of material conditions and a set of discursive possibilities. As such, clarifying a connection between the forms of representation discussed above

and particular kinds of actions, movement in the Myst world, transport, is the variety of manipulation which has to do with creating, expanding and adjusting representations which serve as topological mappings and reflect the relative importance of locations. By the abstraction, objects and information internal to the Myst world are potentially linked to variously complete correlational representations. As seen from the point of view of the game system, both transport and object manipulations are identical; they are signals to the system to alter the state of a set of variables in a manner that produces signs which have visual and auditory form. As seen from the point of view of the player engaged in the game, transport and object manipulations are distinctly different, as they reflect kinds of knowledge which have completely different implications and contexts of relevance. Though they may be related, they either factor in completely different representational domains, or are represented in a few domains at different levels.

Conclusion: Representation, Semiotic Action and Interaction

One of the major problems in the area of multimedia is specifying the nature of interactivity. One of the reasons this term crops up in conjunction with computers, and multimedia in particular, is that computers in their symbol manipulating capacities are characterized by Finnemann's second-order algorithms which yield the ability to branch away from whatever task is at hand and follow other programmed instructions which amount to taking a different course. This possibility introduces the complexity of non-linear processes. This is in contradistinction to the condition of linear mechanisms which may be able to stop a process, or alter the timing of a process, but

which are not capable of more complex non-linear branching. This seemingly removed circumstance, which differentiates linear and non-linear processes, is invoked by the player in Myst via his mouse clicks. After presenting the content of a frame, the Myst game system waits for the player to choose an action and signal it. Based on this choice, the game system follows the branch of instructions which that choice is set to initiate. A preliminary assessment might lead one to say that the game is interactive. It responds to the action of the player with another action with reflects a choice between options, which is then followed by another choice, and so on. One must ask, however, in what regard and to what degree this ability to choose in this discourse represents interactivity. This is, of course, dependent on how one defines interaction. Relative to other media contexts, where the discourse of user intervention takes the form of movie choice, channel change, or preference of editorial style, the discourse of user choice implemented in multimedia is tantalizing. Nevertheless, if this is the frame of reference, it gives a rather undifferentiated view of the matter.

In the discussions of audio-visual effects and the discourse of the pointer above, emphasis was place on the fact that the game system is suited to the task of presenting a convincing model of a world in which the player has a navigational and operational capacity. Later, in conjunction with the discussions of knowledge and action, this form of activity, as a manipulation of the game system, was shown to be interrelated with types of knowledge which the player forms, partially in response to this possibility for action. Such knowledge is specific in content but generic is form. It represents the product of trials and errors as well as the other kinds of experiences which inform understandings of technology and ma-

terial things in general. In an operational context such knowledge responds to questions like, "How do I use this?", "What is this useful for?", "What happens if I do this, or that?" What it means is what is useful to know for making it work. This is not the only applicable register, but it serves to point out that the player's understandings of Myst are in part pre-figured by his prior experience into which Myst enters as a differential signification. For example, in terms of mapping and correlations, these forms of representation are absolutely generic. Reading a story which involves a number of locales, for example, it would be expected that one would develop some form of topological representation of the world described in the narrative. In other genres, correlational representations would be indicated. The computer, and multimedia in particular, enhance the combination of these two forms of representation in a unified context. Nevertheless, the discourse of player action in this regard, is so limited that, though it results in an exciting, active form of reception, it can only be regarded as interactive in the most banal sense. This is the same sense in which the Webster's defines "interact" as "to act one upon the other", which leaves one no closer to an understanding. Turning to another nexus of possible interaction, namely story content, recall that it was pointed out that the player, though he intervenes in the sequence of frames presented, has no means to effect the content of the story. His actions may impact upon his knowledge of it, however as a pre-existing element of the game, it is fixed and not responsive in any sense. In this regard, the most one can say is that, like when reading a book or watching a film, the primary form of influence on the work in reception is to turn away or make

marginal or averse interpretations. This is, of course, not what is indicated by interactivity. Myst succeeds at an engaging version of worldmaking, which is a type of communication, but it seems that the game system is simply too limited to entertain a sophisticated version of interactivity.

If, for instance, the game system was capable of reflecting the player's construction of artefacts in the world, or additions to the story contents, this would be a significant step. But would it be enough? Turning to Webster's again, "interaction" is "reciprocal action or influence." Modelled in semiotic terms by Jensen, this is described by a relation of two interpreting subjects engaging each other in a social process of semiosis ... [such that they] ... may redescribe each other – and their purposes and contexts – both as subjects and objects of action, ends and means of society." (p. 48) It will be little while before this degree of interactivity will be a common feature in computer mediated communication. Neural networks and systems based on them represent an interesting attempt at depicting active learning on computers. There are games, for example MOO's and MUD's, which allow players to alter a world which they "cohabitate," but not as a reflection of the identity of a particular game system, rather as a reflection of the variety of semiotic systems people can mobilize in their interactions. There is a sense, though, in which Myst may be taken as an aspect of this kind of interactivity. That is, as an element in the on-going process of game development. Myst is an element in a discussion which, via user input and the efforts of clever game designers, yields ever more sophisticated unions of computers and communication.

Notes

1. A longer version of this paper was presented to the Multimedia and New Media Technology Working group of the 12th Nordic Conference for Mass Communication, Helsingør, Denmark in August of 1995. Many thanks to Lektor Klaus Bruhn Jensen, Department of Film and Media Studies at the University of Copenhagen, and Professor Jørgen Dines Johansen, Center for Literature and Semiotics at Odense University, for their generous and thoughtful contributions to this version.
2. Copyright Brøderbund Software, 1994.
3. These are composition and decomposition, weighting, ordering, deletion and supplementation, and deformation (1978/1988: 7-17).
4. See, for example, the vocabulary used in Macromind Director, an industry standard multimedia development package. It employs a frame metaphor to describe the organization of events in time. A grid structure is used to visually coordinate discursive elements: The vertical axis represents channels overlapping in depth, while the horizontal axis contains frames which locate and coordinate channellized elements in time. Most significantly, the order of frames in this grid is not binding as looping and jumping between frames can be achieved via programming. This programmability is the key technical feature underlying dynamic multimedia.
5. Nelson Goodman, in conjunction with an argument concerning what he calls "the rightness of representation," identifies two uses of "realistic": Realism in the sense of habituation and of revelation. I refer to the first sense through out this discussion. Goodman clarifies, "According to the more frequent usage, a picture is realistic to the extent that it is correct under the accustomed system of representation; ..." (1978/1988: 130f).

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