TECHNIQUES FOR INTERACTIVE COMPOSITION AND SOUND DESIGN: COMPOSING A MUSICAL SCORE FOR THE FIRST-PERSON ADVENTURE GAME “THE LIBRARY”

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Table of Contents

Interactive, digital multimedia is becoming a corner-stone of contemporary culture. This is evident through the rapid growth of the Internet and the World Wide Web, the proliferation of personal and commercial web sites, CD and DVD-ROM based entertainment, and the widespread use of electronic mail in both academic and professional spheres. What is interactivity though? How is it defined when we are inundated by so many different kinds of multimedia, many of which claim to be “interactive?” It is important to be able to make the distinction and separate the gen-uinely interactive from those that are interactive in name only.

Interactivity comes in many different flavors; each type of digital multimedia piece has its own brand of interactivity. A DVD-ROM may be interactive in the way it allows viewers to change the order of scenes or the ending of a movie. A web site is interactive in the way that it can customize content and show users exactly what they want to see. Interactivity starts with the presentation of content, and is then modified by the end user/viewer to fit their personal needs or goals.

In The Interactive Book, the first full-length work on interactivity, Celia Pearce (1997) defines interactivity

as an exchange that is “mutually or reciprocally active.” She asserts that “interactive” relates to a two-way communication system that involves orders and responses and is “characterized by reciprocity.” The presence of “choice” and “response” define the interactive relationship: choice by the user, and response by the content source. A closer look at these principles allows one to distinguish the degree of interactivity for a given work of digital multimedia.

Using Pearce’s rubric to analyze music, it is easy to see how live music, when played by human performers, is inherently interactive. Musicians create music and the audience responds, either showing approval or indifference. Their responses influence the musicians, and a performance can be either dynamic or lackluster due to audience feedback. On a musician to musician level interactivity is a crucial part of any successful performance. Players and singers must listen to each other and cooperate while balancing the musical elements of pitch, rhythm, dynamics, and emotion during a performance. These elements are all part of musical interpretation, a player’s “feeling the music,” based on their knowledge of the musical style and emotional connection to the performance. This

interpretation is crucial for both notated and improvised music. However, when putting music into the context of interactive multimedia, this kind of natural, organic, and emotional interpretation becomes complicated.

In fact it is nearly impossible. Lack of the ability to feel and interpret is the computer's greatest weakness (Winkler, 1998). One cannot expect an unfeeling machine to duplicate the very human experience of "feeling" music. The world's greatest performers are highly talented, and either musically trained or raised in a musical environment. Their ability to interpret and feel is a function of who they are as people. This "model" for musical performance is clearly not the best for dealing with music on the stage of digital interactivity. Composers and multimedia designers can use it as a point of departure or inspiration, but the standard performance model requires fundamental alterations to work in the context of multimedia.

A musical performance model that is more closely related to multimedia is that of film music. Film and multimedia are both presented to the viewer/user on a screen. Both require a team of individuals to produce them, and the production is completed before the final presentation of the work (as opposed to "real-time" pro-

duction in a theater or concert venue). Music involved in the production has been written and recorded in advance and is custom-tailored to enhance the story that will be presented. It is the image/sound correlation that is crucial to the success of any piece combining audio and visual elements. Film-sound designers and composers were the first to experiment and learn the techniques behind successfully pairing image and sound tracks. Currently, computer game designers are following suit by using film techniques to enhance the potency and drama of the gaming experience (Murray, 1997). This practice prompts a natural step in the evolution and development of interactive media.

Computer games are an important driving force in the genre of multimedia as a whole. Not only is the gaming industry growing rapidly on a financial basis; games involve some of the most complex and rewarding interactive design schemes available. And, like films, games create an imaginary world where players can be transported to experience stories and adventures that are not a part of their “real life.” “Films are fantasy – and fantasy needs music,” said Jack L. Warner of Warner Brothers Studios. Similarly, games need music to complete the immersive experience and directly involve players in the fantasy

world they create. As a designer, producer, or composer for interactive multimedia it is important to understand the power and influence of music in a production. It is also important to know how to best realize the music/image relationship in an interactive environment. Composers must be able to simulate the dynamic ebb and flow of film music while balancing it with an ever-changing story line, character dialogue, and image track. To better understand this process it is helpful to examine the history of interactive music in both the live performance and digital arenas.

History of Interactive Music

The history of interactive music begins in the concert hall around 1950. The first composer to include concepts of interactivity was Earle Brown. Brown, along with John Cage and a handful of other composers, was experimenting with different techniques of indeterminacy. As an answer to the absolute order and control found in serial compositional techniques, and as a personal need to liberate music from its heritage and tradition (Griffiths, 1981), Cage was one of the first to experiment with ele-

ments of randomness in his music. Brown, as his contemporary, was influenced by this technique but took a much different approach. Brown's compositions were conceptually similar to the "floating variations" in an Alexander Calder mobile or the "spontaneity" of a Jackson Pollock painting (Griffiths, 1981). They possessed a randomness of form that allowed the players to combine pre-composed musical material freely in all possible permutations (Winkler, 1998). This produced an overall "impression" of the piece; the musical affect was achieved through an unordered presentation of musical ideas rather than the linear assembly of themes and melodies found in more "traditional" music.

While this music does not immediately seem to have the reciprocity deemed necessary for an interactive work, it does possess an important characteristic that allows for interactive exchange: the overall musical statement is made by the random assembly of material. Because it is dependent on a random source for direction, this kind of musical structure is the perfect complement to the unpredictable series of exchanges between user and computer when running an interactive multimedia program. The user interaction is different each time the program is run.

However, the music that accompanies that interaction can be assembled and recombined in all variations to comment on specific actions and produce an overall affect that is consistent with the greater thematic message of the multi-media production.

Though this technique works well in the context of an interactive production, it was originally conceived for musical performers and realized in the concert hall. Brown probably never imagined that his interactively-based concepts would eventually be used by both human and electronic performers. Computers have become an important part in both the composition and performance of interactive music. Max is a graphical computer programming language that is designed for interactive composition between a human performer and a Macintosh computer. Using the Max authoring environment and a MIDI (Musical Instrument Digital Interface) system, composers can write pieces for live performance involving a computer and one or more musicians. In the case of a duet, composers write two components: a part or score with musical directions for the human performer, and a computer program in Max that will serve as the accompaniment. The performer, using either a MIDI instrument or device to translate acoustic

sounds into MIDI information, plays the composed music. The computer, with the aid of the Max system, “listens” to the human performer and generates the musical information that is dictated by the accompaniment program. The possibilities for Max are vast. As a digital “music engine” it is able to freely explore multiple musical variations. Musically, it can simulate the interaction that happens between two human performers. While Max cannot compete on an emotional level, its advantage is that a part can be written for the computer that is unplayable by a human, thereby expanding the scope of musical virtuosity and imagination.

Max has the unique ability to let a computer “listen” and respond to a musician’s input. It is mainly used as an interactive link between performer and machine; the results of that interaction are heard by the audience and this serves as the performance. Tod Machover’s interactive musical experience Brain Opera is similar to Max, but has a much wider scope of interactivity. While intended for the concert hall audience, it draws its interactive components from many different outside sources and goes far beyond the reach of a single performance venue. Composed in 1996, Brain Opera is a musical multimedia experience

drawing from a range of sources: composed musical material, Marvin Minsky's Society of Mind, the artistic process and experience of creating the Brain Opera, live vocal performance, listener generated music, and music interactively created by participants over the Internet (Brain Opera). As a work in three movements, the Brain Opera is presented onstage. It uses a variety of unique technologies to gauge audience input and generate many of the visual and musical elements. All components are intended to synergize onstage and present a "musical journey into your mind" (Brain Opera). After its debut performance at Carnegie Hall the Brain Opera toured the world between 1996 and 1998 as a work in progress. The definitive version will be performed in July of 2000 in Vienna, Austria. There it will find its home as a permanent installation. While the presentation of the Brain Opera is very different than a user/computer interaction, it is an interesting example of how many different interactive techniques can be used to generate music. It also extended the interaction to a global audience on the World Wide Web.

The interactive nature of the World Wide Web makes it a very good venue for interactive music. The most obvious benefit is that composers have the potential to attract an

enormous audience to their music. The web also allows composers to publicize and distribute their music while incurring few to no expenses. Unfortunately, for every advantage there is at least one drawback. The greatest disadvantage composers face online is the issue of compatibility. Composers must save their music in a format that can be loaded and read by a web browser such as Netscape Navigator or Internet Explorer. If a user/listener's web browser is not equipped to handle a particular music format the music will not be playable until the proper software is added to the browser. While this is a simple process, composers cannot assume that a listener will take the extra steps to obtain the necessary additional software. Until audio formats become more standardized on the web, composers must strike a balance between a format that fits their creative demands and matches the playback capabilities of their audience.

Interactive Music and the World Wide Web

There are numerous digital audio formats that are available on the web. The rapid growth of Internet technology and bandwidth leave these formats in a constant

state of flux. Newer, faster formats threaten to outdate, out-stream, and marginalize their predecessors. Currently there are several formats available on the web that have the right conceptual and technological approach. It is impossible to say if they will remain in vogue for the long-term, but the potential they offer makes them noteworthy. The formats themselves are not interactive. Only when integrated into an interactive production is their non-linear potential realized.

Koan is a generative music engine; a digital improviser. In order to hear music in this format the listener's web browser must be both equipped with the Koan plug-in and have access to a bank of MIDI sounds on their computer. When linked to an HTML document, a Koan file will use the browser plug-in and sound bank to play the generative composition contained in the file. Koan composers write their compositions by authoring a computer program in the Koan Pro environment. The program/composition contains parameters for time (duration and meter), rhythm, pitch, phrasing, repetition, dynamics, and instrumental voice. Using these parameters as a set of "musical rules," the composition plays until it reaches a conclusion. Depending on the composer's musical intentions these

parameters can vary between absolute serial control and indeterminate chaos.

Developed by SSEYO Ltd., the Koan system has enormous potential. In addition to using standard MIDI sounds on the user's computer, it supports MP3, WAV, SoundFonts, and other proprietary audio formats (see glossary of technical terms). Koan files are very compact and neither browser nor platform specific making them easily accessible over the web. And, to expand its multimedia potentials, Koan can be interactively integrated into an HTML environment and with the vector animation program Macromedia Flash. Koan is available to anyone who wishes to download the software from the Koan web site.

In addition to a large amateur following, Koan has attracted the interest of professionals in the music industry. Brian Eno, composer of ambient music and producer for David Bowie and U2, was the first composer to release a Koan "album." Entitled Generative Music 1, the release has twelve generative compositions for playback on a personal computer equipped with the Koan plug-in software. Eno's works are not interactive: his music is intended for a linear listening experience – one that is different each time. This characteristic makes Koan a

perfect vehicle for musical interactivity because it can produce virtually limitless variations while following the directions of a composer.

Another Internet-based interactive music format is Beatnik. Beatnik Inc. was founded by Thomas Dolby Robertson with the intention of bringing a new and exciting audio experience to the World Wide Web. Like Koan, Beatnik music files require a browser plug-in. However, Beatnik files are fundamentally different from Koan. Beatnik music is not generative, so rather than have a program that serves as the blueprint “score” for a musical piece, the files are linear compositions or songs. Beatnik composers can assemble their music and sounds from a variety of audio sources: AIFF, WAV, MP3, and Standard MIDI (see glossary of technical terms). Once a composition is compiled, Beatnik generates a compact RMF (Rich Music Format) file. These RMF files can then be interactively accessed and played by a Beatnik-enabled web browser using Javascript, Macromedia Flash or Shockwave; or Macromedia Director if the music will be heard in a CD-ROM based production. In addition to being usable in a variety of environments, the RMF files deliver compact, high quality, multi-track audio. This makes them perfect for delivery

over the web or in other low-bandwidth applications. Currently, Beatnik is an “up-and-coming” digital music format, but due to its portability and compact nature Beatnik has great potential to become a significant component of interactive audio.

Another digital format that is becoming very common on the web is Macromedia Shockwave. Shockwave is not just for audio and music, it is a compression codec that compacts and optimizes interactive productions for the Internet (Roberts & Gross, 1999). To use Shockwave composers and designers must assemble their work in either Macromedia Flash or Director and then apply the Shockwave compression to their production. The advantage to Shockwave is that it is part of a comprehensive authoring environment where composers can assemble an interactive musical piece.

Shockwave does not provide a means for music composition; audio must be recorded and transferred to a digital format such as AIFF, WAV, Quicktime, MP3, or RMF (see glossary of technical terms) before it can be imported into a Macromedia application. Once inside the application the composer can design an interface that drives the interactive musical composition. This process is more

involved than adding a set of interactive “cues” to a web site, and it gives a composer much more control in the playback and interactivity of the composition.

These formats - Koan, Beatnik, and Shockwave - are not standardized and all can be obtained for free on the Internet. This is not an all inclusive list, but it does describe contemporary formats that are the most promising for musical interactivity. The issue of compatibility still remains however. Even with the necessary software installed there are many variables surrounding a user’s computer, its sound capabilities, and their Internet connection. Any of these can obscure an interactive piece if not configured properly. For composers to be sure that their audience hears the music as intended, a more reliable, alternative medium is CD-ROM. By creating a specialized application to present their music and storing that application on CD-ROM, composers can have more control over the playback of their music and can reduce the risks of incompatibility.

Musical Artists on CD-ROM

Laurie Anderson, Peter Gabriel, and the Residents are

all contemporary artists who have realized their interactive musical visions on CD-ROM. Laurie Anderson is both a composer and multimedia performance artist. Much of her work is geared towards live, theatrical performance. Her interactive CD-ROM Puppet Motel (1995) was a step in a very different direction. With the help of designer Hsin-Chien Huang, Anderson has crafted an interactive musical and narrative experience that is like exploring “someone else’s dream” (Goldstein, 1995). Users can explore Puppet Motel and discover short stories, musical toys and games, digital art, cartoons, animation, etc. Anderson’s music and sound design are a large component of the interactive experience. Music serves as a kind of “aural map” or guide as you navigate through Puppet Motel. There are also elements of musical interaction where users can play a “virtual violin” to produce speech sounds, interact with digital acupuncture needles to hear “the music of language” in an interactive story, or substitute Anderson’s pre-composed rhythms with ones of your own to change metric feel of the music (Goldstein, 1995). Puppet Motel offers more than just interactive music, it puts music in the context of art and storytelling to present a truly interactive multimedia experience. It is described by

phrases such as “visiting the dream of another person” because Anderson’s work has the power to transport the user to an alternate reality.

Sometimes the alternate reality presented in a multimedia piece is one that users are glad to see only briefly. The Resident’s Bad Day on the Midway (1995) is intentionally such a piece (Milano, 1996). Co-designed with Jim and Sharon Ludtke, “Bad Day” tells the stories of eleven characters who are either visiting or working at a midway amusement park. The overall tone of the story is dark and depressing. Describing the difficult and unfortunate lives of the characters, the story touches on issues of greed, jealousy, divorce, sexual and physical abuse, and zealous patriotism. The Residents’ music echoes these sentiments and is as much a part of the story as the dialogue and inner thoughts of each character. The interactivity and storytelling of “Bad Day” has many layers. Players can select from multiple points-of-view and see the story through the eyes of any character. Because both musical and narrative elements are so closely intertwined this piece is an excellent example of successful interactive music. It meshes closely with the production’s story to create an alternate reality that is both humorous and

emotionally disturbing.

Another musical artist that is working to achieve alternate realities through multimedia is Peter Gabriel. In his work Eve (1996), Gabriel uses five worlds, “Mud”, “The Garden,” “Profit,” “Paradise,” and “Ruin,” to create an intriguing, emotional landscape. In the worlds of Eve he combines his music, the artwork of Yayoi Kusama, Helen Chadwick, Cathy DeMonchaux, Nils-Udo, and interviews with people who are “in and out of love” (Ladly, 1996). Environmental sound design and musical clips of Peter Gabriel songs comprise most of the audio experience while a user explores the worlds of Eve. In each world users collect musical phrases. These phrases can be used with the game’s IMX – Musical Toys (Interactive Musical Xperience). An IMX allows users to augment and rearrange a Peter Gabriel song. Interactivity is found in the ability to make changes to these songs, and in the fact that original versions can be recorded and shared either online or via personal e-mail.

Clearly the World Wide Web and contemporary CD-ROM based multimedia offer a wide variety of tools for the creation and playback of interactive music. In addition to these technologies, some of the most interesting and

potent interactive audio can be found in the world of computer games.

Computer Games

Interactive game music had a humble beginning in the video arcade. The primitive games of the 1970's had a very simple but effective soundtrack. Both Space Invaders and Asteroids used the motif of a descending bass line. In the first analysis of its kind, Kurt Harland observes that this musical gesture functioned interactively within the context of the game by increasing in speed as an enemy attack became more intense (2000). This very simple interactive concept is an important part of the game experience. Obviously players can see greater numbers of enemies moving in for the attack. But by adding the audio component the situation becomes more dramatic and intense. In The Media Equation, researchers Nass and Reeves note that "for many designers, the formula for immersion begins with audio." Players feel more involved or immersed in the experience of the game when there is an engaging audio component. Tim Larkin, sound designer for Riven: The Sequel to Myst, jokes that audio is "50% of the experience

but only 10% of the bandwidth" (Saltzman, 1999). Unfortunately this has always been true. When Space Invaders and Asteroids were first produced the audio was considered to be a chore (Harland, 2000). It was generally done at the last minute by someone with an average understanding of music. This obviously did not destroy the world of arcade games, but it does demonstrate how sound and music have always had to take a back-seat role in the production of games.

This situation did not largely improve in the 1980's. Of course technology was improving, so it became possible to include digital recordings, higher quality sound synthesis, and MIDI music. With these advances it became justifiable to hire composers to work on the music for games (Harland, 2000). A trend was also started at this time. Game audio, because the technology allowed for it, was expected to sound more like conventional or "typical" listening music. Rather than focus on interactivity it was asked to mimic what people would hear on the radio (Harland, 2000). This "song" format became the standard for game music and it killed the immersive experience. Hearing a song once or twice can be a pleasurable listening experience. But, as Kurt Harland writes, an indefi-

nitely repeated tune becomes a kind of musical torture causing players to leap for the “sound mute” button.

Trends have changed over the years however, and game producers came to realize that music for listening and music to accompany and enhance interactivity are two different things. Contemporary game music is currently the main driving force behind interactive music. Winkler writes that:

> One of the new challenges facing composers of interactive works is to create malleable forms based on flexible structures that respond to human input.

The “malleable form” is an obstacle that game composers must face on a regular basis. In many ways it is the single most important thing that their compositions be able to do. King’s Quest and Phantasmagoria designer Roberta Williams uses the analogy of a “string-of-pearls” (Saltzman, 1999) to describe the structure of an interactive story (see appendix 1). In this analogy each story scene or episode is like a pearl on the string. Within the pearl there are multiple branching story lines that make up the story’s interactivity. Players may follow the story along the branch until they reach the end of the pearl. Then, they have to follow a short fixed path along the

string before entering the branches within the next pearl. Game music, which must also follow this structure to complement the story, should be composed so that it will make musical sense from pearl to pearl and within each pearl's branch.

While the string-of-pearls analogy may not transfer directly to all interactive structures, it is useful for describing the ever-changing conditions of an interactive environment. Harland defines interactive game music as "music that responds to the state of affairs the user is experiencing." Because the music is intended to enhance the gaming experience it is important that it accurately represents the environment and "world" of the game. This music, which often serves as the foundation for any game soundtrack, reflects a player's location, success, danger level, etc (McConnell, 1999). Through careful composition practice a composer can write a score that clearly defines

a player's location within the game and allows them to move freely without upsetting the overall musical structure or destroying the mood.

In addition to giving the user a sense of presence in the game world, the music must also highlight game events that are significant or meaningful to the story. For example, in a sports game there should be "victory music" and the sound of a roaring crowd when a team scores points. This technique can be used to punctuate significant events. It can also be used to help direct a player, such as in Myst (1993) where the music track provides "hot and cold" clues as in a treasure hunt (Murray, 1997). Music and sound design is a vital part of any computer game. As technology has grown so have the techniques to make interactive game audio more effective. Composers must draw from inspirational sources outside of their field if the genre is to continue to grow. The film industry provides some interesting examples that transfer to the world of computer games.

Interactivity and the Silver Screen

The greatest difference between computer games and

films is interactivity. Films are linear with a set beginning, middle, and end. Games, as an interactive media, can have any variety of fixed and variable story elements requiring user input. Harland writes that unlike film composers who can write to specific actions, game composers must compose their musical cues to accommodate endless hours of gameplay. Without a specific set of images to serve as their guide, the act of linear scoring (as in a film) is impossible in an interactive situation. But though they are fundamentally different in construction, the aesthetic goal is essentially the same: the music must assist in the development and unfolding of the story. Consequently, there are many common techniques that can be adapted.

For example, the level of sophistication found in the sound design of film serves as a good role model for computer games and other interactive media. The hit game Myst (1993) is a shining example where most of the "immersive power" of the game is achieved through its complex sound design (Murray, 1997). Rather than the stereotypical "beeps and bloops" that are associated with computer games, Myst uses an array of realistic environmental sounds. These work to create the game's "aural

world” that is comparable to the audio enhancement or “sweetening” of natural sound effects that can be heard in the cinema.

In general, contemporary game design is borrowing many ideas from the silver screen. The Lucas Arts title Grim Fandango (1998) serves as a good example of this. It is described as a “graphic adventure,” which means that the game is like a movie where you (the player) control the actions of the main character (McConnell, 1999). You direct Manny Calavera, the protagonist of Grim Fandango, through the story world of the game uncovering mysteries, meeting other characters, and experiencing the adventure.

The story of Grim Fandango borrows some of its ideas from the film-noir era and a great deal of the music had to reflect this stylistic trait. The game’s composer based his score on swing jazz and the classical scoring of Max Steiner. Borrowing ideas from the films The Big Sleep, Casablanca, and Treasure of the Sierra Madre, Peter McConnell created the jazzy musical world of Grim Fandango (McConnell, 1999). With its intriguing story line and unusual cast of characters, the experience of Grim Fandango is very film-like. McConnell’s Steiner-inspired writing helps heighten this effect and increases the dra-

matic depth of the game. Sound designers and composers alike can learn a great deal by studying the film industry (Marks, 2000). As games get more interactively sophisticated, the narrative content should follow suit: because music and sound are crucial to the success of both these elements, a closer look at the role of sound in films is beneficial.

Film Scoring and Immersion

Maurice Jaubert said that “we do not go to the cinema to hear music. We require it to deepen and prolong the screen’s visual impressions” (Gorbman, 1987). He continues, saying that like a script music enhances the storytelling, “which is above all the function of a film.” What Jaubert is saying is that music is a vital part of any cinematic story because it makes that story more personal. Music gives a film qualities that cannot be communicated solely by the visual track. These are things like “mood, pacing, and emotion…” (Gorbman, 1987). When someone is crying on screen are they tears of sadness or joy? The context of the story can help with this but so can the music. And, because it is a temporal medium, music can portray changes

of mood and emotion as they occur over a period of time.

Music also helps to provide a transparent narrative structure by creating for the viewer a “point of experience” (Gorbman, 1987). Music tells the viewers what to look at on the screen and how to feel about the characters in a story by serving as a translator for the visual track. Without the correct music, a scene could be completely misunderstood or misinterpreted.

The presence of music can transform the affect of a visual scene. We label what we hear in the context of its environment (Chion, 1994). For example, if a viewer saw a silent scene of a sandy plateau they might think “this is a beach.” However, if the Beach Boys song “Surfin’ U.S.A.” were paired with that image the viewer would unmistakably set the scene on a beach in California. Now take the same beach shot, remove the Beach Boys and play “Hava Nagila.” The scene (and our viewer) are suddenly transported to Israel. This illustrates one of Gorbman’s classic film principles; the fact that film music allows viewers to reference time and place (p.73). The visual track was not altered, but sweeping changes in the sound component set the scenes in opposite corners of the world. This illustrates one of the capacities of film music. It tells the

audience how to interpret on-screen images.

Film music also has the power to transport the viewer out of the theater and into a personal fantasy world defined by the movie. Gorbman (1987) describes this affect as a “for-me-ness,” a “bath or gel of affect,” and a sense of personal connection to the fantasy that is presented by the movie (p. 5). In a word, film music is “immersive,” it smothers the viewer in the drama of the film and brings them into the world it creates.

Immersion is accomplished by breaking down the viewer’s need to analyze media content. Research on the topic of audio fidelity has shown that when viewers/listeners are subjected to poor quality audio it sounds unnatural, and they consciously monitor its content. Conversely, when the audio fidelity is high (natural sounding) they are “immersed” (Nass & Reeves, 1996); that is they are less likely to scrutinize what it is they are hearing. This openness, or less critical state, “removes barriers of belief” according to Gorbman (1987) and makes it easier for viewers to dream (p. 55). Once these barriers are demolished a film is free to tell its story, leading the audience any way
it chooses.

Film is able to exercise this kind of control because it depends upon the synergy of visual and audio elements to increase the immersive potency of its story. The relationship has a synergistic effect because the elements of sound and video are inextricably linked in a viewer's mind. Michel Chion (1994) describes this as a "simultaneous vertical relationship" (p. 40) between audio and narrative, while Gorbman (1987) calls it a "combinatoire of expression" (p. 15). If a sports car is shown on the screen, then viewers expect it to look and sound like a sports car. A t-top and wide tires are only part of the scene. The audience doesn't really see it as a sports car until they hear the roar of the engine and rock-and-roll music.

What if, for example, the rock-and roll was playing from a nearby stereo store? And what if the shiny car was just a model? And, what if the engine roar was only a rusty Ford Pinto careening out of control only to knock the model over? The illusion is too convincing and the audience is duped. Seeing a fancy car, while hearing both a roaring engine and rock music causes viewers to make an instant connection and immediately assume that "this is a fast sports car!" The vertical relationship between the

elements in inseparable. And because viewers only see one car they assume that it is the source of the sounds they hear.

Sounds are always applied to some part of the visual track's content (Chion, 1994). If a sound is heard and there is no identifiable object as the source of the sound, viewers can be easily confused. For this reason sound designers and composers must exercise caution that they do not inadvertently draw attention to a portion of the visual track that is not significant to the overall story. In fact, if the sound elements of a film were separated from the visual track they would lose the context provided by the film (Chion, 1994). The visual track is their only frame of reference. Without it a film's sound elements are little more than an abstract composition.

What this tells us is that in order to extract full meaning out of a scene it is vital to have both the visual and audio components. Before a viewer can read films in a "literate" way (Gorbman, 1987) they must open wide both their eyes and their ears. The same is true for an interactive computer game. In order to understand the full scope of a scene players must not only interact with characters and explore the scene visually, but listen to

the changes in the sound. While players may be open to this kind of gaming experience, composers and designers may not be thinking in these terms. Matthew Johnson (Audio Lead, Microsoft) says that the sound design for an interactive environment cannot simply sound like an environment, it has to be that environment (Saltzman, 1999). This kind of authenticity can be accomplished if the composer is thinking of Chion's vertical relationships. Not only do the sound effects need to "be" the scene, but the music should also play an active role in defining each scene and contributing to the overall immersiveness of the game. When all of these elements are working together the computer game will contain a kind of narrative depth that has so far only been found
in films.

"The Library"

A computer game that is currently experimenting with the techniques of film sound in an interactive context is "The Library" (see appendix 4 and 6). "The Library" is an intensely story driven, immersive, first-person interactive adventure that draws upon medieval Western European monas-

ticism and traditional science fiction motifs in order to create an involved, futuristic murder mystery. Subtly interwoven in the story is the intellectual exploration of such powerful themes as the nature of human ideology and the lure of immortality.

Unlike other such computer based adventures, “The Library” is both completely story-driven and story-focused. All the interactivity and action within the game is inextricably woven to the fabric of the story itself.

The story is this: in the year 4064, religious explorers aboard the PHSS Benedict discover a colossal alien artifact silently circling a dead world. The object, which becomes to be known simply as ‘The Library,’ is devoid of any life whatsoever. All trace of its original builders and inhabitants are long gone. It seems, however, that the structure itself served as some sort of alien repository.

Elated by the stunning discovery of the first evidence of non-human sentient life, the explorers elect to stay and study the structure. All of its secrets lay completely hidden to the outside world...until now. You are a young historian who has been granted the unprecedented privilege to travel to The Library and research the histo-

ry of the monastic community that developed from the original crew of
the Benedict.

Unbeknownst to you, the situation on The Library is far more than meets the eye. You become embroiled in an adventure whose outcome ultimately leads you to discover the original purpose of The Library, a purpose more shocking than you possibly could have imagined.

As a first-person adventure, “The Library” has no specific main character. The designers chose this perspective so that players would not be forced to adopt the persona of a predefined character. Their interpretation of “The Library” depends greatly on their personal ethics and beliefs. This way, players can enter into the game with an original set of ideological and philosophical values.

Story content is the paramount focus of “The Library”. Every event within the game is a crucial component in the overall interactivity of the story. A player advances through the game by meeting characters and working to uncover the mystery aboard the space station. While “The Library” does have a fixed ending it is one that is very open to interpretation and, given the values of the

individual player, can be seen from multiple perspectives.

"The Library" has a depth that, like Grim Fandango, lends itself very well to a more film-like musical approach. I used "Fandango's" concept of "the game as cinema" when composing music for "The Library." The story's interactive structure and rich cast of characters were an excellent source of musical inspiration and allowed me to compose an "interactive score" for Act 1, Scene 1 of this game. Though it sounds oxymoronic, this phrase accurately describes what I have composed. "Interactive" because the music will be heard differently depending on the direction a player chooses in the game, and "score" because like a film, this interactive music was written to specifically match the action and drama of each scene as a player moves through the game.

The Interactive Score

My first step was to compose a set of themes that are consistent with the characters and ideas in the story of "The Library" (see appendix 2). In opera, thematic "leitmotifs" function to associate a musical statement with different themes, places, situations, emotions, and

characters in the story (Gorbman, 1987). The technique is also used in film scores. Max Steiner's The Informer makes use of leitmotifs (Chion, 194). John William's music for the Star Wars series also makes great use of leitmotifs. Thematic tunes are common in the cinema because they allow viewers assign meaning to particular characters or actions. This helps greatly in the "literate reading" of a film's content. The technique is especially helpful in an interactive setting because it allows the composer the freedom to make specific musical commentary on an event or character and add focus to the interactive structure. Gorbman cites this as another of the main principles of classic film music. "Unity" of narrative structure is provided by repetitive musical material (p. 73). Because they are heard frequently and assigned to specific characters or events, leitmotifs actually enhance the interactive structure by giving the randomly selected interactive sequences a particular order.

These main musical themes serve as the basis for most of the melodic content in "The Library". The themes are drawn from four of the major concepts in the game: the folios (found aboard The Library), the Janites (monastic order), the Collectors (alien race), and personal quest.

Each theme was first assigned a scale; from there I composed a melody to serve as each theme's main motif (see appendix 2). Then, using the original scale, variations could be composed as the story and interactive structure dictated.

Each scale was selected to musically represent the theme with which it was paired. The harmonic consonance and dissonance within each scale and theme gives them their musical identity. In the interactive score all of the themes are played against a pedal point, a fixed pitch in the low register that serves as the tonal base for the music. The pedal point allows each scale/theme to show its identity and harmonic idiosyncrasies by serving as neutral foundation on which the music is constructed.

Before the motifs could be assembled into the score they needed a foundation or a kind of "musical adhesive" to bring them all together. This was accomplished by composing a foundation track for each location or area of the game. These foundation tracks are similar to the state music that is found in most computer games. It is challenging to compose this kind of music because it has to be interesting enough to accurately represent a room, but not so involved as to distract the player. Foundation music

must closely follow the film principle that all video and audio information are locked together in a gestalt of meaning. Because interactive gameplay is completely unpredictable, the foundation music could potentially misdirect a player's attention and confuse the meaning of a scene. For this reason, it is vital that the foundation music be written with a transparent quality where it can fill the sound space and create an engaging aural environment while simultaneously staying out of the way of the unpredictable visual track.

My foundation music was composed of several elements. At the core there is the didgeridoo, an Australian Aboriginal instrument. I selected the didgeridoo because it has a very unique "other-worldly" quality that was a perfect sonic match for the alien space station. Also, as a droning instrument, it is ideal for establishing a pedal point (fixed harmonic foundation) in my music. The didgeridoo was joined by other ambient, electronic sounds that could be modulated over time to change texture but preserve pitch. Through the use of these sounds, mixing techniques (volume, stereo panning, etc.), and a careful "transparent" composition, the foundation music came to life. To fill-out the composition, sound effects were cru-

cial to the overall immersiveness of the interactive score.

Sound effects and the game's sound design schemes must also obey the "transparent rule." Because a player is expecting the sounds to be linked to one of the game's visual elements, they must have the same opaque quality as the foundation music. A poorly placed sound effect could easily disrupt a scene and obscure its meaning.

Composing sound effects is quite similar to composing music. While qualities of pitch and rhythm are approached differently, the overall compositional shape (to a series of effects) and their dynamic relationships must be carefully constructed just as in a musical composition. Rather than write long, linear sound compositions I composed my sound effects in modules, small sound chunks that can be strung together in a variety of combinations. This makes it easier to disguise the inevitable repetition of a linear piece. By writing audio scripts (lines of code in the computer program that trigger the audio) I set the modules to play randomly, based on timers and random number functions. This process involves a tedious fine-tuning of the code, but the overall affect is perceived as authentic because it is based on a random, organic

process.

A good example is in the Garden, a room in “The Library” were the monks grow most of their food. The garden is an enormous hydroponic farm filled with plants, trees, fruits, and vegetables. No animals inhabit the Garden. However, it is a sonically rich environment due to the flow of water through the hydroponic system and the sounds of foliage rustling in the breeze. In this location there are eight different environmental sound modules. Each is randomly cued by a variable timer. This loose structure gives the garden the impression of a very natural sound environment when in fact, it is very structured.

This combination of thematic motifs, foundation tunes, and sound effect modules work synergistically to create the interactive soundtrack for “The Library” (see appendix 5). Their relationship is as follows: for each room, or location a player can visit, there is a set of sound modules to create the ambient noises that are native to that room. Layered with the effects modules is a foundation tune. Each room has its own foundation tune that best represents the environment and the story events that take place there. Foundation tunes are each set in their own musical key, and the relationship between the tunes is

based on a symmetrical scale. I do this so that as a player moves from room to room the key of the music will change but the player will never feel “tonally grounded” (see appendix 3). The transparent nature of these tunes allows them to establish a new musical key and set the stage for the action that will unfold in the room with which they are paired.

The interactive score comes alive when the thematic motifs are employed. Following the contour of the script and subtext of the dialogue, the motifs are heard as a player advances through the story of “The Library”. By asking questions, and listening to the accounts of the characters they encounter, a player’s actions or choices cue the necessary sound files and generate the interactive score. The responsiveness of the interactive score is in the feedback provided by the music. Like a jazz improviser using altered, exotic, or extended scales over a static pedal tone, the motifs are dependent upon varying tonal relationships with the foundation tunes. The motifs rely heavily on their tonal (scalar) qualities to create the desired musical affects. Cues musically match the events that trigger them. For a “scary” choice players hear “scary” music and should feel fear in their current situa-

tion. Through a careful process of planning, composition, and layering, the motifs are arranged so that as a player experiences the game, different motifs are heard and can make specific commentary on the interactive drama.

These are the main components of the interactive score. There are also several smaller aspects that help tie the entire Act 1, Scene 1 together. As a player moves from room to room in “The Library” they must walk down long corridors. The act of walking through the Library requires sound and music to help tie together the foundation tunes (in a tonal sense) and also serve as the sound environment of each hallway. These “traveling tunes” were composed so that they would cadence as the destination room is reached. Coupled with the “travel music” there are also sound effects to describe the cavernous, metallic quality of the corridors and to represent the sound of the player’s footsteps while walking. All of these components, when taken as a whole and implemented within the interactivity and action/drama of the game, comprise the soundtrack for “The Library”. As an interactive score the elements are all dependent upon the interactivity of the game, but function like a linear film score by setting a scene’s mood, pacing, and emotional content; foreshadowing;

and helping the player to interpret each scene. After completing this project it was interesting to look back at both the creative and production processes and critique my work.

Personal Critique

Overall I can say that the interactive score is successful, though it is still a long way from commercial development and implementation. One major flaw is in the inefficient infrastructure of its coding. I am not a professional level programmer, and though the interactive score is running properly on the code that I wrote, it is a working model at best.

My model needs to be developed as a music “engine;” something that can run in the background of an interactive production and serve as a manager for all of the sound related tasks. This concept is not new to the world of interactivity. The iMuse system, developed by Lucas Arts, has been praised for the fluidity and responsiveness it can bring to interactive music (Marks, 2000). An audio engine for my interactive score would insure both efficiency and consistency throughout the entire production. It

would also be able to track elements related to the story, such as your relationship status with other characters, their opinions of you based on what they have “heard” from other characters, your behavior or personality within the story, etc. All of these parameters affect the eventual outcome of the interactive drama and are crucial to the interactive score. If the music engine knows the state of a particular relationship, it can call upon the correct music to communicate that state in the context of the story.

This approach puts a lot of pressure on the composer to write a huge body of music for one production; perhaps more minutes of music than there is time in the story. To prevent an exponential explosion of music, composers could use the leitmotif idea that I have discussed. This would allow for the repetition of key themes and re-use of common material. Clearly there are many aesthetic hurdles to composing in this fashion, but with careful planning and composition I know that an interactive score could be assembled successfully on both musical and technical levels.

Musically speaking, I think that my interactive score functions well and supports the drama in the way it

should. The flip side of this statement is that it is not the most interesting piece of music for linear listening pleasure. Without the on-screen characters and dialogue, my interactive score is the abstract composition that Chion explained it would be. I think that the interactive nature of this piece makes the musical “abstractness” even more pronounced. This is neither a success or failure. Rather, I see it as an interesting condition to be aware of when composing interactive music in general.

Can interactive music ever be composed with a linear listening experience in mind? Before completing this project I would have said yes; now I am not so sure. With current computer technology, interactive multimedia must be accessed via the user’s keyboard, mouse, joystick, etc. In order to keep track of the interaction the user must watch the screen and listen for computer feedback. This give and take with both the computer and the interactive production forces the user into a very different kind of experiential setting. Unlike a concert hall or other musical venue where listeners can direct their attention where they please, interactive multimedia demands that they remain focused on the screen. On the computer screen, as in the cinema, the correlation of audio and visual events would

be inseparable. Consequently, the overall experience would demand the kind of attention we exert in the movie theater rather than in the concert hall. Even if the visual component of an interactive musical composition were only present to control the interaction (no story, etc.) it would still render the listening experience different from an evening on the couch listening to our favorite CDs.

I believe that the way we interact with the computer has an enormous impact on the immersive quality of the experience. Currently, we are forced to see some kind of visual component to relay interactive information and interactive music must take this into account. In the future, “hands-free” tools for computer interaction could significantly change an interactive musical experience into something much more personal, engaging, and allow listeners to redefine their relationship with the screen.

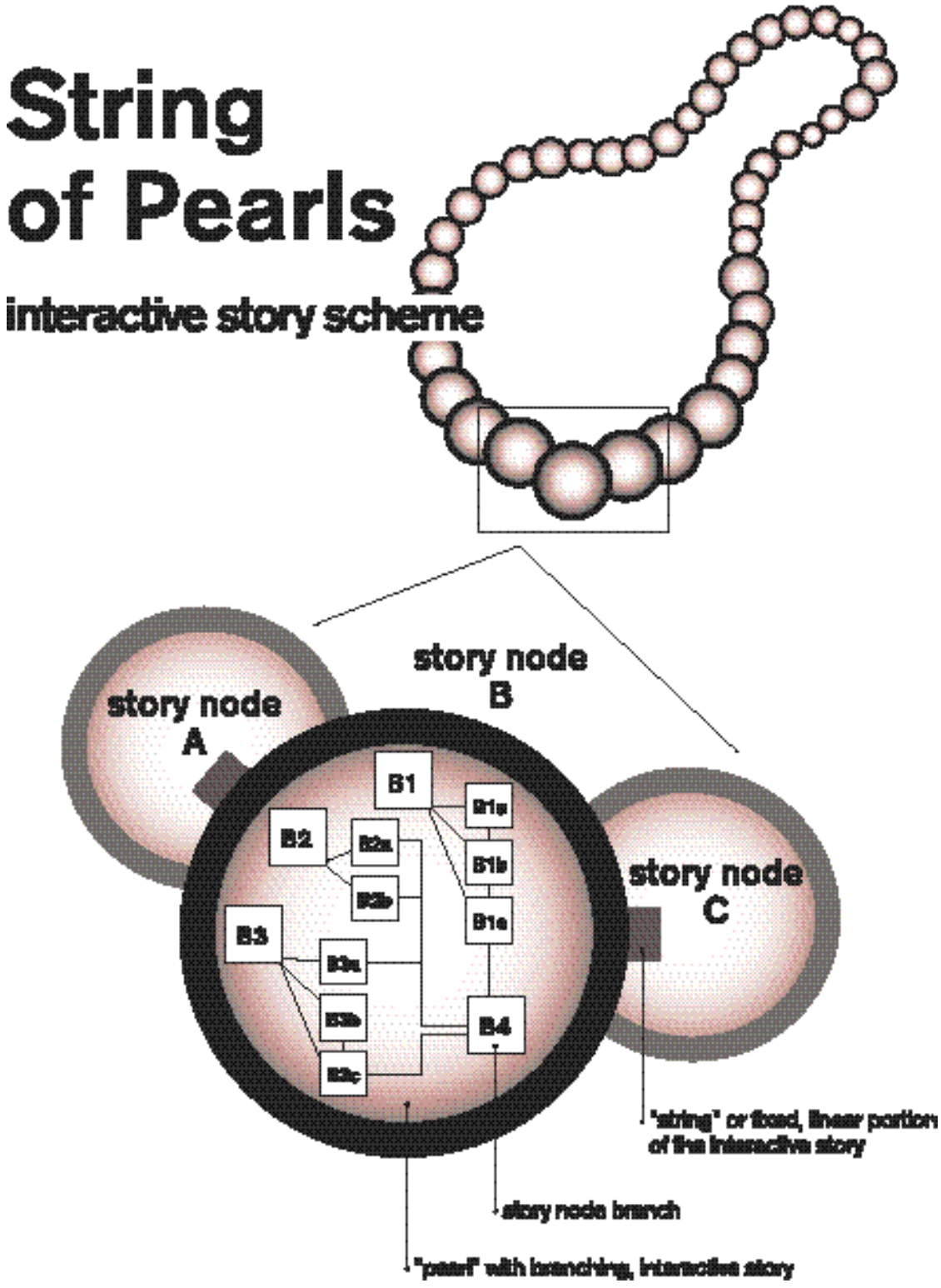
Concluding Thoughts

The interactive computer game score is a creative step forward in the world of interactive music composition. It is a step forward because it focuses on the aesthetics of the medium and provides a new fundamental perspective. It is too easy when working on interactive pro-

jects to get caught up in the technical aspects and forego the issues of content and message. Savvy technological engineering will never be able to save a poorly designed interactive experience (Pearce, 1997). Designers may be able to create an amazing visual experience and combine it with cutting edge sound technology, but if the core idea is weak or underdeveloped, the final product cannot expect to be much better.

Bad Day on the Midway designer Jim Ludtke notes that interactive entertainment titles put too much emphasis on the tools that were used to create them (Milano, 1996). As a result, the medium suffers. Designers exert more energy trying to “out-cool” the other titles on a technical level, while the story content and message become nothing more than an afterthought. If interactive entertainment is to evolve, the technology that is used to create it cannot be the driving force in the evolutionary process (Pearce, 1997). Improvements in technology are a valuable asset and can help producers, directors, and designers tell their stories in more dynamic ways. But, if a story or concept is weak to begin with, no amount of technological fire-works will be able to save it.

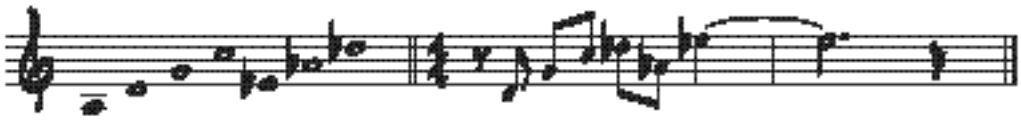
In addition to becoming more content-focused, interac-


String
of Pearls
interactive story scheme
story node
A
story node
B
story node
C
B1
B1a
B1b
B1c
B2
B2a
B2b
B3
B3a
B3b
B3c
B4
"string" or fixed, linear portion
of the interactive story
story node branch
"pearl" with branching, interactive story

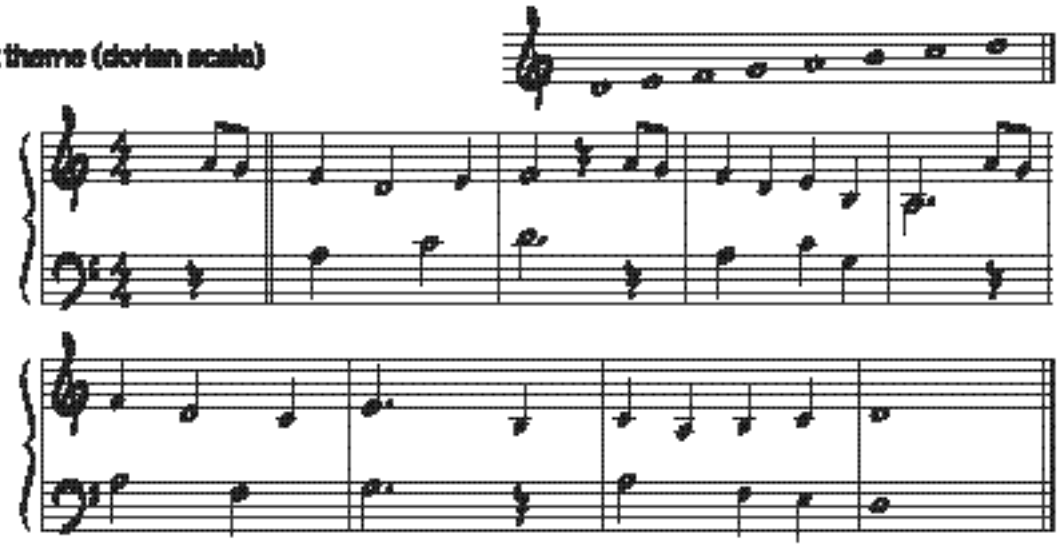
Thematic Music

scales and motifs relative to D pedal point

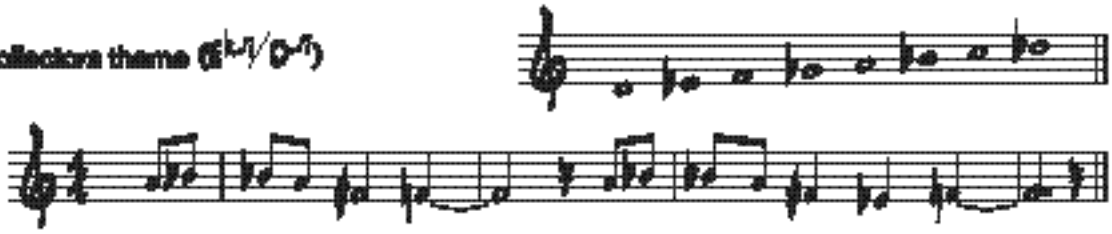
Folio theme (perfect fourth pattern)



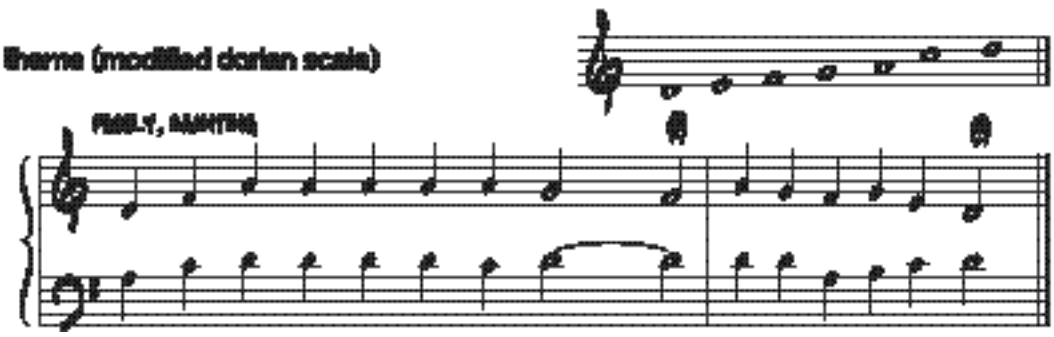
Quest theme (dorian scale)



Collectors theme ($E^{\flat}$/$D^{\sharp}$)

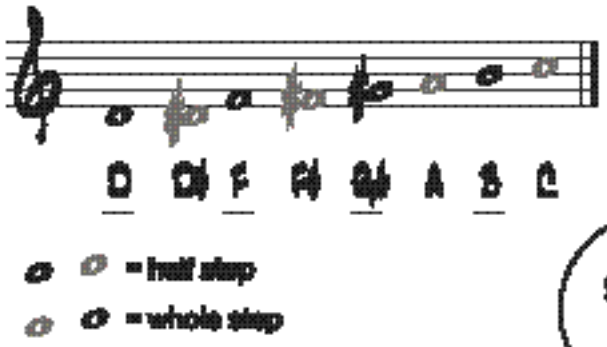


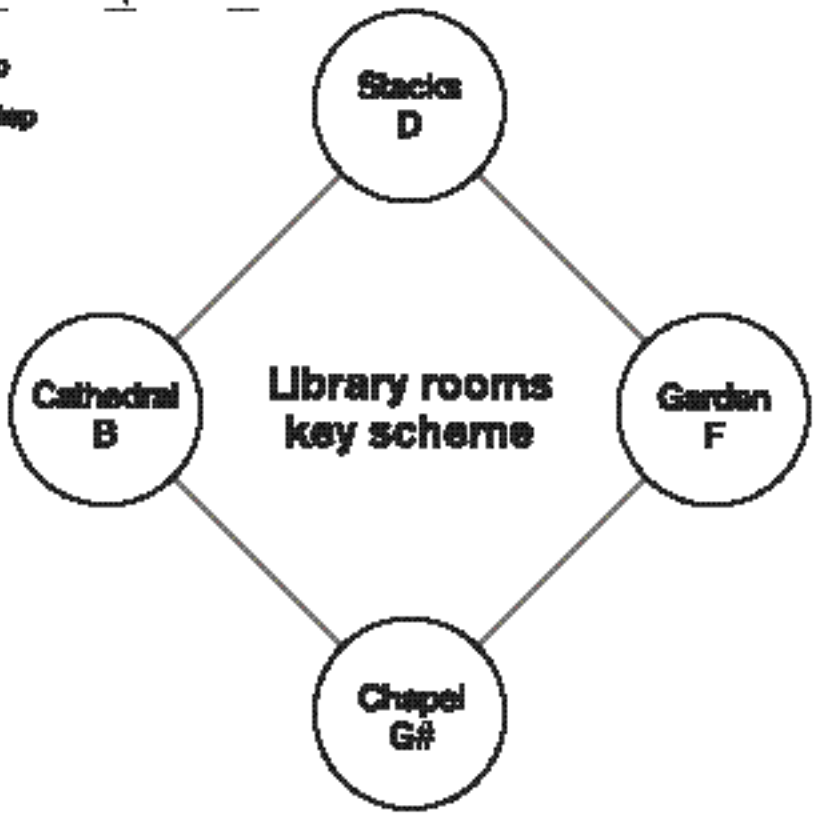
Jardin theme (modified dorian scale)



Tonal Scheme

based on D/F/G#/B half-whole octatonic scale (symmetrical scale)





Appendix 4

“The Library” as a group design project

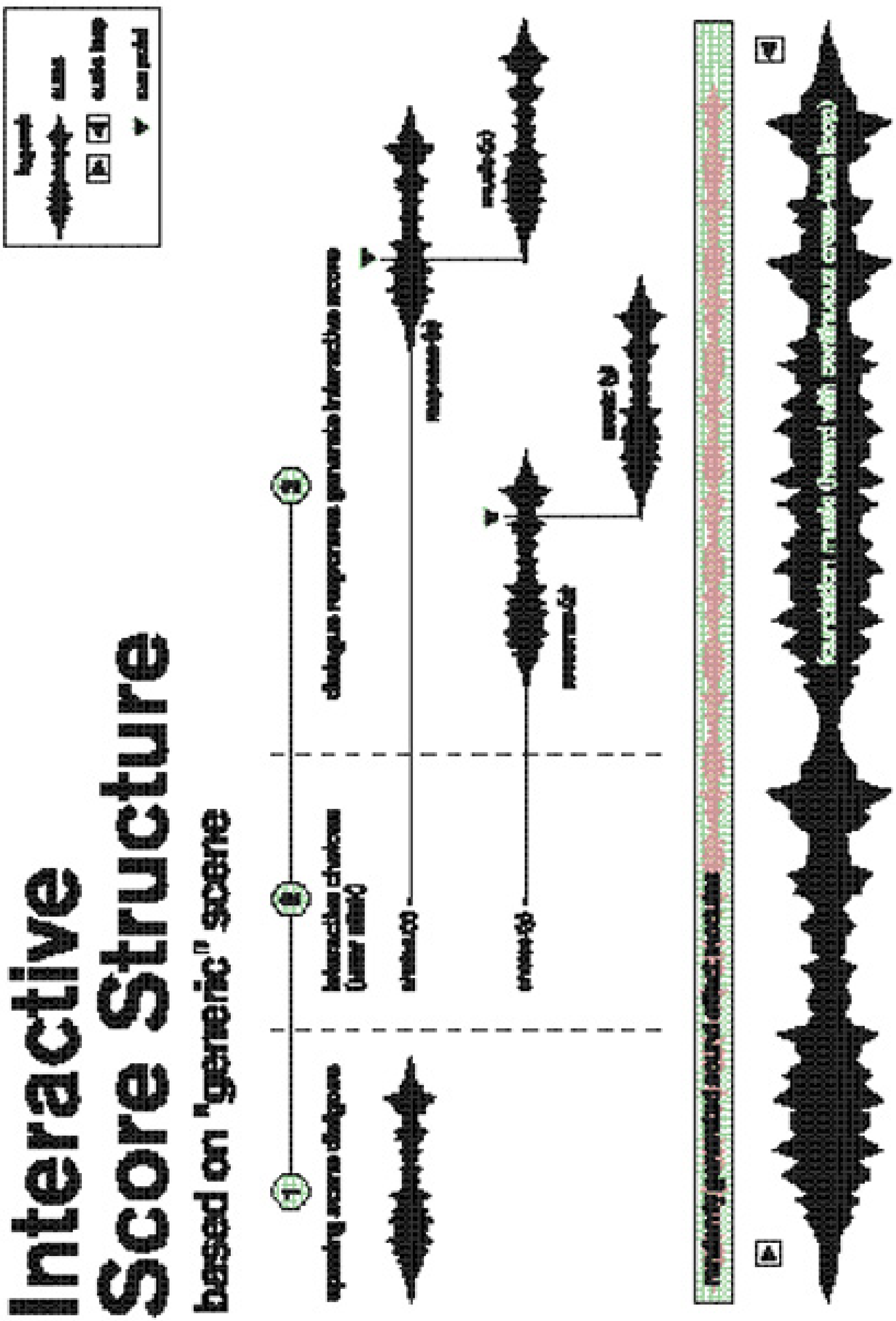
“The Library” was a project that came out of Dr. Thom Gillespie’s class: Interactive Storytelling and Computer Game Design in the spring of 1999 at Indiana University, Bloomington. The core design team consisted of myself, two other graduate students, and one undergraduate. Together we conceptualized and wrote the story for “The Library”. This work included global story parameters, character descriptions, an interactive scheme for Act 1 Scene 1 of the game, a comprehensive “future history” that contextualizes the story, an overture of musical themes, script and story boards for a cinematic trailer; a trailer with musical score, sound effects, and voice-over narration, and the initial design document for “The Library”.

Our group produced a large and diverse body of work that semester. It would not have been possible had we not been able to draw from the many talents within the group. We had an archaeologist, a writer/researcher, a 3D modeler/animator, and myself, a musician and composer. It was an odd band of people to put together a computer game,

but the synergy of the group made it possible.

Since that time the team has grown twice as large, adding a concept artist, a computer programmer, and two script writers. The progress and development of the game continues as well. Our team plans to complete the definitive design document by June of 2000, solicit the concept to professional game development studios (see appendix 6), and secure a contract for the commercial development of “The Library”.

If we never make it that far I will not be disappointed. This project has served as an amazing learning experience for all involved. The story and the concepts surrounding it have been the foundation for an individualized major degree, my masters thesis, and other miscellaneous credit hours for students in the group. “The Library,” as a group project, was the perfect vehicle. We could freely pursue our interests while still remaining rooted in a “real world” project that was exciting, rewarding, and relevant to contemporary interactive media.


Interactive
Score Structure
based on "generic" scene
randomly generated sound effect modules
foundation music (heard with continuous cross-fade loop)

Appendix 6
"The Library" Potential for Professional Development

No one really knows exactly when and why things started to go wrong for humanity. Some believe that the Great Plague was the beginning of the end so to speak. While this argument certainly has merit, there are scholars, among which I am numbered, who believe that the changes in fact began much earlier in the mid 21st century.

A long series of unnecessary and bloody "police actions," the ever-widening chasm between the haves and have-nots, unchecked population explosions, and the increasingly dangerous exploitation of global resources all wore down the human will. Our behavior was altered in such a way that, even if we had wanted to, we were totally unable to escape the downward spiral that ultimately resulted in the African Continental War (the largest global conflict ever experienced), the Great Plague, and the descent into darkness that followed.

After innumerable years of chaos, thankfully, those who remained began to rebuild. Eventually, human beings spread out into the cosmos. It was there that we met our next greatest challenge.

The Library...

Josephus Cray

Excerpted from Original draft of The Terran Histories
Reproduced courtesy of the University of Tranquilitatis Planetia Centre for Archival History.

INTRODUCTION

The Library is an independent interactive entertainment title in the first person adventure tradition of Myst and Riven. Currently in production, The Library combines western European Medieval monasticism with innovative science fiction themes to create a completely immersive "whodunit" with an unpredictable and compelling ending.

Unlike other interactive entertainment titles currently in production (or recently released), The Library's primary focus is its gripping story. While large interactive entertainment studios have mostly ignored the recent outcries within the game industry for story-focused games, the designers of The Library firmly believe that the industry must direct its attentions towards the art of storytelling. However, the designers of The Library also fully understand the sheer emotional impact that both sound and visuals has on an entertainment experience, and are attempting to create a sensory experience that rivals some of the best previously released adventure titles. Ultimately, the aim of The Library is to combine highly immersive visualization, innovative sound artistry, pioneering story telling, and groundbreaking world building into an experience that is totally consuming and exciting for the player.

"The original inhabitants of the Library, called the Collectors by the Janites, left us no clue to their physical appearance. Though this hasn't stopped people from speculating."

Josephus Cray,
The Terran Histories, Vol IX

METASPACE

The Library takes place in the MetaSpace reality. Designed originally as part of the backstory for the game itself, MetaSpace has grown tremendously to encompass an ever-expanding 2500 year biological and social history of numerous galaxies. The Library exists as a single point located along the fertile MetaSpace continuum of technological innovations, cultural development, and political events. The internal fabric of MetaSpace is a constantly expanding entity that is holistic insofar as all the events that occur within it (including those of The Library) are intrinsically linked to one another.

Does a complete fictional reality really make that much of a difference to a story? Science fiction authors and filmmakers have certainly been placing their stories in highly detailed realities for years and have benefited greatly from it. Larry Niven's Known Universe reality has spawned many tremendously popular novels. One of the most enticing features of

George Lucas' Star Wars franchise is the fact that they take place in a realistically detailed universe. It is that very universe, in all of its intricacy and realism, which helps us to identify with the characters and, thereby, become far more immersed in a story that, under normal circumstances, might seem fairly ordinary? Unfortunately, despite some very rare examples, the interactive entertainment industry has yet to catch onto the benefits of holistic fictional realities.

Ultimately, beyond contributing to the excitement and immersiveness of The Library, the goal of MetaSpace is to set a benchmark within the interactive entertainment industry for the creation of a believable and complete reality in which any number of stories (digital, paper, film, or television) can be told, and create a widely marketable franchise.

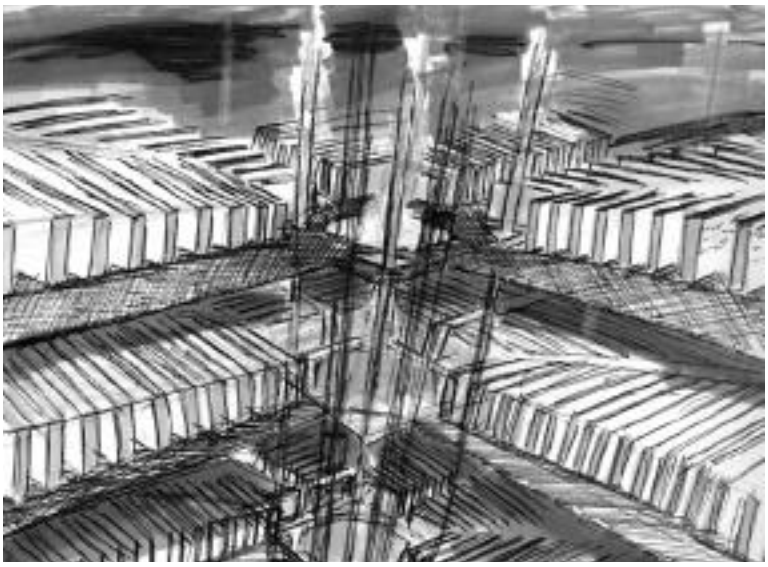
"Because they dominate such a huge ammount of space, the Stacks were probably the main focus of the Library. They stretch forever in either direction, disap - pearing from view. Small robot "minders" scurry throughout the stacks, the 'click-click' sound of their legs against the metal echoes eerily through the darkness."

Brother Jos Seles,
Executive Officer, PHSS Antioch

THE STORY

Hundreds of years of indiscriminate fossil fuel use finally took its toll as many nations were forced to draw from their reserves. As a result, oil became an increasingly precious commodity. Existing oil fields were fanatically guarded, and new resources were immediate fought over.

In an effort to stem the tide of the approaching chaos, the United Nations involved itself in a string of extremely unpopular peacekeeping missions. Unfortunately, the United Nation's efforts were almost always seen as a ploy to monopolize increasingly dwindling oil resources. As a result, beginning in the early 23rd century, countries began removing themselves from the United Nations out of protest. These departures destabilized an already fragile international community. The final nail in the coffin, so to speak, was the beginning of the African Continental War.



Like many other previous conflicts, the African Continental War was waged primarily over fossil fuel. Late in 2293, a previ-

ously unknown oil field was discovered in the northern portion of Angola. The field was close enough to the border that Zaire resurrected a century old border dispute and claimed that the oil fell within the confines of their border. Unlike previous disputes of this manner, the United Nations, because of both weakness and apathy, was unable to immediately moderate the matter. The conflict, which had started as an exchange of heated words between two national governments, quickly degraded into one of the bloodiest wars in the history of human kind.

"We cannot hope to fathom the nature of the Library within a short time. We must dedicate our very lives to unravel the mystery of the Collectors and why they built this remarkable structure."

Father Lucius,
Initial Report to the
Papal Hegemony

Much like the First World War, the conflict escalated in scale when it drew in many countries allied with both Angola and Zaire. The killing fields soon encompassed the entirety of Western and Southern Africa. In a vain attempt to put an end to the conflict which had already gone on from 3 years and had claimed an estimated 1.3 million lives, the United Nations sent troops to force the warring parties to end the conflict. Unfortunately, the plan completely backfired. The UN forces completely underestimated their battle-hardened opponent, and were drawn into a conflict that now was three sided.

Until the early 24th century, the conflict was restricted almost entirely to conventional warfare. In 2322, however, the Angolan Alliance released a large amount of unknown biological agents over the city of Solwezi, Zambia. The United Nations Forces immediately retaliated by embarking on a conscious plan of biological warfare. The next 7 years that followed saw the deaths of more than 8 million combatants. While the death toll of civilians was never formally quantified, the number has been estimated as being in excess of 12 million.

By the middle of the middle of the 24th century, there was nothing left to fight over. The Western and Southern portions of the African continent were almost completely destroyed. Huge tracts of land were so "hot" with deadly viruses that they were absolutely uninhabitable.

No peace treaties were signed, no reparations made. The social and political dynamic of the African continent had been so affected that even if the respective parties had wanted to sign a peace treaty, there simply wasn't any form of centralized government with which to negotiate. In total,

the loss of life during the African Continental War was estimated at 23.7 million individuals. This estimate, however, never included the countless people who died shortly after the end of the conflict as the result of the deadly biological agents that still were scattered throughout the countryside. None of this, however, prepared the world for what was to come: the Great Plague.

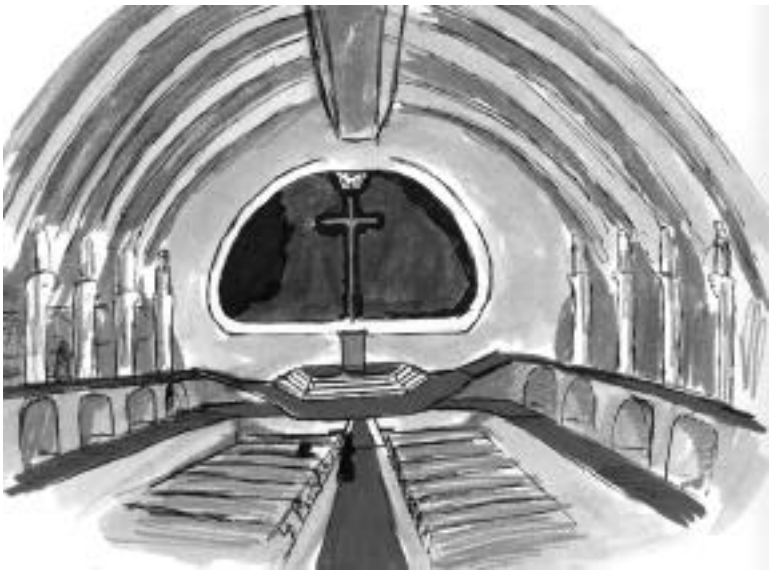
A Norwegian doctor first diagnosed Gray's Syndrome in 2622. The Virus itself attacked the heart muscle in such a way that the patient eventually died of heart failure. Death, however, was not immediate. The patient could live up to 10 years before succumbing to the affects of the virus. While no one was quite sure as to the cause of the syndrome, it was speculated that the widespread use of biological weapons during the African Continental war had unforeseen consequences. Whatever the case, Gray's Syndrome spread so quickly that countries were unable to cope with the epidemic. The little research that was carried out was completely unable to determine the virus' vector. Unfortunately, this ignorance incited mass hysteria among the people of the world.

"We've established our chapel in one of the Library's larger spaces. Despite the fact that we've done our best to make it look like home, it still feels horribly alien. I'm always distracted during Mass with the feeling that we are interlopers here; constantly being watched."

Brother Michael,
Report ./12.56.5.63-a/8z

In best-case scenarios, individuals diagnosed with Gray's Syndrome were quarantined in harsh internment camps. In the worst of cases, victims of the disease were hunted down by vigilante mobs and executed. Millions of individuals died before the virus had a chance to take its toll.

The chaos that followed the beginning of the Great Plague lasted in excess of 800 years. Surviving documents point to an almost complete breakdown of conventional order. Humanity sunk into a state of near barbarism that resulted in the loss of almost all but the most basic technological, scientific, and medical knowledge. For reasons beyond anyone's understanding, Gray's Syndrome burned itself out sometime in the beginning of the 31st century.



Slowly, those who survived the Great Plague began to rebuild. The learning process associated with the Post-Chaos

Renaissance fostered a renewed sense of hope. One of the most interesting social phenomena during this period was the Papal Hegemony.

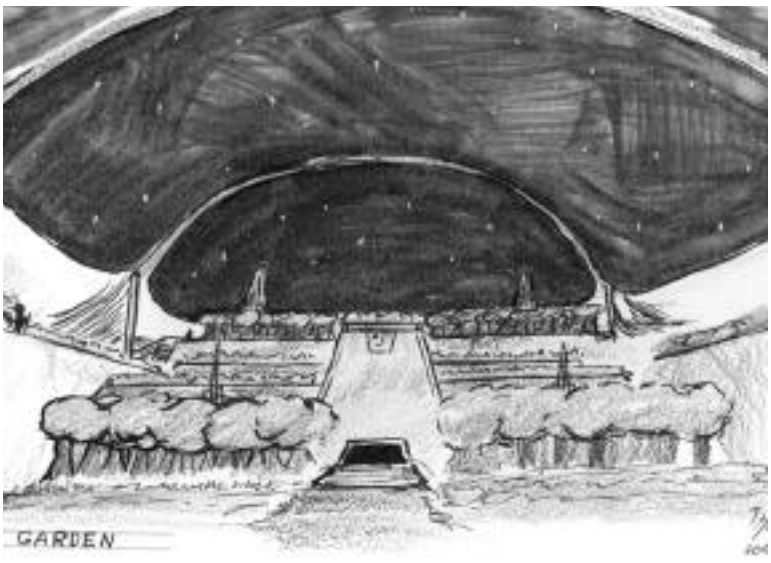
Much like in the like in the European Dark Ages, the Catholic Church survived the Great Chaos. In fact, the numerous monasteries scattered across Europe and North America were responsible for the curation of many of Pre-Chaos historical documents. When the Great Chaos ended, the Catholic Church played an important role in many of the scientific discoveries that characterized the Post-Chaos renaissance. The Vatican became the center for the renaissance's first political entity. Encompassing much of Western and Central Europe, the Papal Hegemony became a dominant sovereign international power.

"At first, the Garden was a way for us to be entirely self sufficient of our vessel. Hydroponics allowed us to grow all maner of edible fruits and vegetables. Now, the garden offers solace, a touch of home to those weary of the cold passageways of the Library."

Sister Brigid,
excerpt from personal journal

In 3728, the North American Dominion, consisting of portions of the former United States, Mexico, and most of Eastern Canada, is formed. Eighty years later, in 3808, The Papal Hegemony and the North American Dominion sign a treaty of mutual cooperation for space exploration. A short time after, the North American Dominion began the construction of Rama, a high orbit Research Station. Named after a 20th century science fiction novel, Rama housed over 2000 scientists and engineers working on such problems as faster than light propulsion, ship construction, and human social and cognitive adaptability to space travel.

The dawn of the 40th century brought a monumental scientific breakthrough onboard Rama. After years of study, Hiroku Toshiro proposed the theoretical foundations necessary for the development of faster than life propulsion. Toshiro posited that an opening could be created in the fabric of space through which vessels could pass into what he called MetaSpace (m-space). Due to the nature of the interaction between the propulsion system and m-space, the journey to any given destination, however close or far, would take 20 months.



"The work that we're carrying out here is certainly exciting. Recently, however, this place has begun to affect us all. Certain of our order are acting strangely and I don't know quite what to make of it. There is something we are not seeing..."

Brother Stephen,
excerpt from personal journal

Navigation through m-space is accomplished through the use of extremely powerful sentient computing machines called Navigators. The larger a craft is, the more powerful the Navigator need be. Without the help of the Navigators, a ship would drift forever. While entering m-space is easy, leaving is difficult without extremely precise re-entry coordinates. A proposed solution is the construction of jump beacons. Ships traveling through MetaSpace fix on the signal of a jump beacon and use its coordinates to re-enter realspace. Realizing that the placement of jump beacons would have to be done without the help of MetaSpace vessels, scientists on Rama immediately begin the construction of large conventionally powered spacecraft.

In 3945, the first working model of the MetaSpace engines, called the Toshiro Drive is built. The first tests, carried out between Luna and Mars, indicate that the drive will function properly over much larger distances. The Papal Hegemony starts construction of three MetaSpace ships in a series of three low earth orbit spacedocks. Shortly after, in 3948, the first Navigator, aptly named Alpha, comes online at the re-established University of Illinois, Champagne-Urbana. Its first words uttered by its vocal circuits are Cogito Ergo Sum...I Think Therefore I Am.

In 4073, the first MetaSpace vessel constructed by the Papal Hegemony discovers the Library, a lifeless alien space station hovering silently over a dead planet in the Perseus-Pisces supercluster. While the Hegemony eventually sends the PHSS Benedict (a ship crewed by a religious order, the Janites, founded specifically for space exploration) to investigate, the Library's discovery is kept secret for nearly one hundred years.

Meanwhile, before his death, historian Josephus Cray, author of the Terran Histories and arguably one of the most popular Post-Chaos authors and scholars, directs the construction of ISIS, the most powerful artificial intelligence ever conceived, and the creation of the ISIS Foundation. The Foundation, which is directly controlled by ISIS herself, employs hundreds of agents who collect and catalog information about all aspects the known universe.

In 4171, shortly after the discovery of the Library is made public, ISIS petitions the Hegemony to allow an agent to

record the remarkable discovery. Much to everyone's surprise, the petition is accepted. You are the talented ISIS agent who has been chosen to journey to the Library and document the amazing discovery.

But this will be no simple research assignment. All that you know hangs by a thread of murder and madness, sin and saint-hood. Beware, for the Library is far more than anyone could have ever conceived.

"It's huge...simply huge...what in God's name is it?"

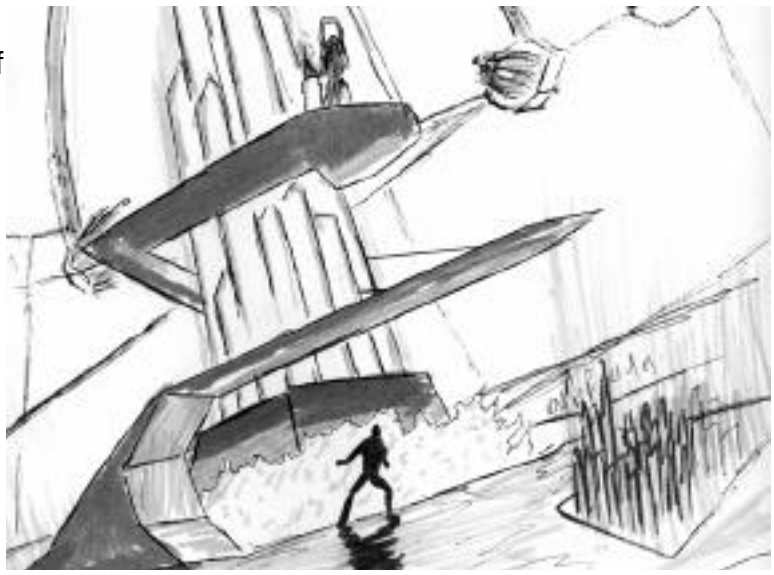
Father Stanos,
Captain, PHSS Antioch

POTENTIAL

There is no doubt that the interactive entertainment industry is lucrative. In 1998 alone, sales exceeded 1.2 billion dollars. In light of this, the financial possibilities for The Library are indeed great. Similar titles within the interactive adventure genre (such as Myst, Riven, and Journeyman 3: The Legacy of Time) are among the highest grossing titles in the industry's history.

Games are looking a lot more like movies these days. Three-dimensional graphics have dramatically improved the realism of games in just the past two years. Today's computers are capable of running games that are vast in scope and can take weeks to play. Designers splice in plenty of live video into their games with ever-rising production values. That allows them to create characters and stories with depth, as well as the kind of action-based plots that resemble Hollywood blockbusters. The Library's engrossing story, compelling sound artistry, and visual scope make it as much of a cinematic experience as a computer game.

Hollywood movie studios, their eyes on the growing numbers of computer- and video-game players, continue to try turning hot games into hit films. Consider Wing Commander, a science-fiction action film released last year by News Corp.'s Twentieth Century Fox and directed by Chris Roberts, who created the multimillion-selling personal computer game series of the same name. At Viacom Inc.'s Paramount Pictures, veteran Die Hard pro-



ducers Lawrence Gordon and Lloyd Levin are developing a movie based on Tomb Raider. And New Line Cinema, a division of New York-based Time Warner Inc., is expected to release Mortal Kombat III, based on the martial-arts game, sometime after 2000.

"It's not about how many games you sell, but how you can expand the premise of a game into a feature film," says Thomas Reed, president of the film-licensing division of Interplay Entertainment Corp., a Los Angeles game company. If a game doesn't have a good story, a license may not be worth all that much.

The bottom line is that The Library's gripping story ensures not only that it would be an enthralling interactive experience, but also that it would easily translate easily into a feature film, novels, a syndicated series, or web based animated serials. The Library, and more specifically MetaSpace, represents the potential for an fairly expansive franchise.

Glossary of Technical Terms

AIFF: Audio Interchange File Format (.aif). A digital audio
format primarily used on Macintosh computers.

MIDI: Musical Instrument Digital Interface (.mid). A standard of digital communication between musical instruments and computers. Standard MIDI is a MIDI file type that is universal between all MIDI compatible devices and programs.

MP3: MPEG Layer 3 compression (.mp3). A compression codec developed by the Motion Pictures Experts Group, currently in its third version.

Quicktime: A multimedia format developed by Apple Computer. Used for digital audio, video, animation, and streaming media over the Internet.

RMF: Rich Music Format (.rmf). A proprietary digital audio format developed by Beatnik, Inc. and generated by the Beatnik editor.

SoundFonts: Proprietary MIDI compatible sounds native to PC sound cards such as “SoundBlasterLive!”. As typographic fonts are a family of any given typeface, SoundFonts are a family of related digital sounds.

WAV: IBM compatible (Windows OS) digital audio format (.wav).

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Brain Opera [On-line].
Available: http://brainop.media.mit.edu

Koan [On-line].
Available: http://www.sseyo.com/koan/index.html

Shockwave.com [On-line].
Available: http://www.shockwave.com

INSTRUCTIONS FOR INTERACTIVE SCORE CD-ROM

1. Insert CD-ROM into any Macintosh computer; be sure your computer’s sound is enabled. For a premium listening experience, headphones are recommended.
2. Copy the "interactive score" icon to your desktop (option + click and drag to desktop).
3. Double-click the "interactive score" icon to launch the program. Movie may take a few moments to load.
4. Use your mouse to navigate through the interactive story. When the mouse is moved to the perimeter of the movie window, the cursor may change to an arrow. Hold the mouse button down to "explore" the room. You can talk to Brother Stephen by mousing over his image. When your cursor changes to a dialogue balloon, click and he will respond.
5. Movie controls:

   press **q** to skip the intro movie(s)

   press **1 - 7** to adjust the sound volume

   (1 = softest, 7 = loudest)

   press **r** to reset the interactive score
6. To quit, either click the quit icon (stop sign) or type command-period (⌘ .) on your keyboard.

Vita

Norbert Francis Herber received his Bachelors degree in Jazz Studies from the Indiana University School of Music in 1996.

Upon graduation he began working as a saxophone and wood-wind performer. He also worked as an arranger and composer on both commercial and personal projects. In the fall of 1998 he was awarded a teaching assistantship and began graduate studies in MIME (Masters of Immersive Mediated Environments), Department of Telecommunications, Indiana University, Bloomington. His interests lie in interactive composition and scoring for new media and conceptual sound design .