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Destination-Imagination:
An Introduction to the Memorial Art Gallery

by

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Dedicated to my family for making this possible and for always believing and supporting me in my decisions...

I would like to thank everyone who helped me in so many ways to complete this project.

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THESIS STATEMENT

The purpose of this CD-ROM is to provide children with an introduction to the Memorial Art Gallery as well as teach them how to look at art. The project will consist of two parts: a tour of the gallery and a section where children will be taught how to understand art. The presentation may be used in a kiosk, in a classroom as a teaching aid, or in a media center. The target audience will be kindergarten through sixth-grade children. The final product may be distributed to local schools and can also be used as a template by other galleries and museums.

The interface will be adequately designed with the intended audience in mind so that children in the aforementioned age group will be able to easily interact with it. The possibility that this product may be used either by an individual or in a classroom setting where a number of people may be using it simultaneously will also be addressed.

CONCEPT FOR THE CD-ROM

SECTIONS:

1. TOUR - This section will give the user a chance to view selected paintings from the gallery by choosing from categories such as places, portraits, and animals.

2. EDUCATIONAL SECTION - Basic art concepts will be taught through interactive games and activities. Two paintings will be used to highlight these concepts.

INTRODUCTION

The original and basic concept for this CD-ROM was developed by Susan Peters, Director of Education at the Memorial Art Gallery, and Gordon Goodman, Professor of Information Technology at the Rochester Institute of Technology. My thesis partner, Kristine Hwang, and I first met with Susan and Gordon in October of 1995. We were given the task of developing a CD-ROM that could be used to introduce children to the Memorial Art Gallery. Its main objective was to expose school children to the works of art in the gallery and to some basic art concepts. The CD-ROM would serve as a pre-tour of the gallery so that children would be better prepared when they visited the gallery.

The clear distinction between the two objectives — to showcase the works of art in the gallery and to educate children about art — helped us in the decision of dividing the tutorial into two separate sections. The challenge was to design a program which would keep a child interested, be educational, and make the best use of

the nature of the medium. Both Kristine and I worked equally on the CD-ROM and all decisions were made by both designers, with the final approval of Susan Peters. At the same time, we both chose areas in which we would like to place our attention.

Kristine, whose background is in Graphic Design, decided to focus on the layout aspects of the screens and on the creation of a grid that could be used for this purpose. These proved to be difficult tasks, especially since both of us had agreed that we wanted the overall design to be elegant and yet appropriate for its target audience while keeping in mind that the center of attention should always be the artwork itself.

With a background in Industrial Design, I chose to look into the navigation and how the user interface could be made simpler and more effective. I also looked into the area of information design to understand how learning could be enhanced through the use of interactivity and multimedia. In combining our findings, we both agreed that the final product should consist of a successful combination of simplicity and elegance, without losing sight of the fact that it should also be fun and, especially, educational.

RESEARCH

Information was gathered from several sources in order to better understand how this CD-ROM should be designed. Books that teach art concepts to children, articles on interactive presentations used by museums and potential competitors' products, such as other CD-ROMs, were examined during this research. Susan Peters and other education professionals also aided by frequently reviewing the concepts and the CD-ROM and then providing us with their feedback.

In order to better present the results of my research, the different materials that were used were divided into four main groups: children books which explain basic art concepts and theory; studies on how to present the contents of a museum through interactive media; books on visual design, interface design and information design, and CD-ROMS and interactive applications that could be considered "competitive" products. In addition, we accompanied a group of sixth-graders on a field trip to the art gallery, during which we were able to make a hands-on and practical analysis of their reactions to the works of art.

The first task was to determine what basic art concepts were going to be presented in this CD-ROM. Books which aimed to explain art to children were very helpful in determining what should be included in this project. Discussions involving the use of color, geometric shapes, and subject matter, appeared in most of these books and were the basis for the lessons given in the CD-ROM.

After reviewing these books, we gained a better understanding of how these concepts could be more clearly presented through the use of interactive media. The ability to demonstrate each concept with the use of artifices such as animations, to allow the user to interact with the material and to provide him or her with instantaneous feedback, were clear indicators of the superiority of the computer as a teaching tool.

One of the primary weaknesses of printed media in attempting to explain certain concepts became apparent through their limited ability to illustrate the concepts that were being described. For example, a book would talk about perspective and show a static drawing where principles of perspective were used. It would then try and explain through extensive use of text or complicated terms, how the perspective of a scene or object was affected by the point-

of-view from which it had been created. In the CD-ROM, we would be able to let the user experience this shift in perspective or point-of-view by picking a floor on a building, and seeing automatically how the original scene would change as the point-of-view moved up or down.

Following is a summary of some of the literature that was reviewed in order to better understand how user interface and navigation, information, and education design should be implemented to create an easier and more effective experience for the user. Considerations were also given to the visual design aspects of an interactive presentation and how the correct use of design techniques could be used to enhance a presentation.

Probably one of the best references for developing the user interface scheme and storyboarding for this CD-ROM, was Tom Wujec's paper: "Multimedia Interface Design". The author divided the process of developing a good interface into six steps, which were used as a basis during both the research and creative stages in this thesis:

- *Determine the scope and purpose of the interactive presentation*

This is used in order to form an outline indicating where the importance of the presentation is and how one's efforts can be concentrated on that area so that goals can be successfully achieved.

- *Decide on how much information the interactive presentation will cover*

This helps in determining what should be included and in pinpointing the specifics that will be covered during the presentation from a content perspective.

- *Decide on the resources the interactive presentation will require*

At this point, a timeline should be developed with an estimate on how much time will be required to build the separate parts of the presentation and how each step will be accomplished.

The second step consists of *researching who the audience will be* — who the target user for the presentation is. This is an extremely important factor that should not be overlooked when designing an interactive presentation. It is very helpful for the designer to envision him/herself as a the possible user in helping to determine how the information should be presented.

The third stage of the process deals with *information design* and in deciding how the content will be divided and displayed through

the presentation. One of the most important considerations is how the information will be organized so that it will be most effective in delivering its message. The correlation between the different layers of information should affect how content is grouped or distributed, as Edward R. Tufte, author of Envisioning Information, notes “what matters — inevitably, unrelentingly — is the proper relationship among information layers. These visual relationships must be in relevant proportion and in harmony to the substance of the ideas, evidence, and data conveyed.” (55) At this stage in the process, a brainstorm session can be helpful in coming up with interesting and different ways in which the information on the presentation can be presented: using quizzes, games, and simulations can result in a more exciting product. After deciding on the format for the overall presentation, a storyboard can be created outlining how the information will be divided and how the navigation will occur at a more generic level.

The fourth step takes into consideration the *different elements that will make up the presentation*: text, images, sound — and how they should be integrated. It is important at this point to review some human-factors considerations such as determining the amount of text that will be present for users to read and the color of the

background that will be chosen. Screen layouts should be sketched out to make sure that all elements are harmoniously integrated and a knowledge of visual design is essential for the successful completion of this task. When people look at a visual space, information is sent to the brain where it is then decoded into a message which is understandable in human terms. It is for this reason that the form in which elements are displayed becomes extremely important and fundamental in the effectiveness of a presentation. As Philip Thiel, author of Visual Awareness and Design points out, "visual decoding takes place at a great variety of levels, and in this sense it is not basically different from the use of any language."(11) It then becomes critical that the designer develops a design scheme that is easily comprehensible by the user; in other words, user and designer should be able to speak the same "visual" language. The responsibility for ensuring that this happens rests on the designer who must make informed decisions when picking a visual vocabulary for a presentation.

Consequently design decisions bear considerably more importance than one may realize. Design should not be seen as the ability to make things look better, it should have a function and serve a purpose. It is then the designer's job to find ways in which a

presentation's functionality can be kept as the number one priority without compromising its aesthetics. Kevin Mullett, author of Designing Visual Interfaces sums this up by stating that "good design defuses the tension between functional and aesthetic goals precisely because it works within the boundaries defined by the functional requirements of the communication problem." He continues by adding that "unlike the fine arts, which exist for their own sake, design must always solve a particular real-world problem."(11)

The fifth step deals with *user interface design* and is extremely important in determining how people will navigate through the presentation.

At this point, a detailed and final storyboard should be created to outline the different levels of information. As mentioned earlier, a knowledge of computer human interface is extremely helpful in assuring that the design of the presentation is user-friendly.

The final step, and one of the most important ones, is *testing and refining*. People who represent the intended audience should be used to test and determine if the presentation is effective. The designer can then use the observations from this process to

improve the presentation and to make sure that it works as intended. (Wujec 181-188)

The book Designing Large-Scale Web Sites offers some useful information on interface and visual design with very clear examples and diagrams illustrating most concepts. The transition between a task-flow diagram and the structural make-up of an interactive presentation is extremely important in keeping the navigation true to what the user should be accomplishing when attempting to make navigation decisions. Defining the task and observing the user's interaction with the presentation should be a primary component of the early developmental stages of a product. The navigational flow should then be mapped to the task flow to ensure that the path is intuitive to the end user and that the task can indeed be accomplished. (Sano 115)

The importance of designing a user driven presentation is also highlighted by Penny Bauersfeld in the book Software by Design. Creating People Friendly Software: "User needs and opinions should be an integral part of software design. To identify the functionality and interaction that will make the user's task as straightforward as possible, find out what users want." (3)

The information present on the literature mentioned earlier leads to the conclusion that a presentation's success depends on many elements which must all work harmoniously. Good content, presented in a coherent fashion and with an intuitive user interface should be coupled with visual design considerations to ensure the overall integrity and success of any interactive multimedia presentation.

Another part of my research consisted of investigating and analyzing how museums can and have been making good use of interactive and multimedia presentations.

Some of the papers compiled in the proceedings of a conference titled "Hypermedia & Interactivity in Museums" offer good insights and case studies which were very valuable in the planning for this CD. Kathleen S. Wilson's report "Multimedia Design Research for the Museum Education Consortium's Museum Visitor's Prototype" was an experiment targeted towards adults with limited or no knowledge of art and art history. The prototype goals were very similar to this thesis project as it aimed to equip users with tools that could be used to better understand art through the use of interactive multimedia tools. It also

promoted an environment that engaged users into exploring the lessons on the prototype, thus allowing them to later experience the works of art in a museum with the benefit of a richer background in art.

Through Wilson's findings, it became apparent that a tool like this would be greatly welcomed by most people since it would open up their eyes to an entirely new way of seeing art. Even a quick glimpse at some of the reactions from the users which Wilson selected for this article reinforce the effectiveness of such introductory interactive programs for museum visitors:

"This is really interesting and fun. . . . If you're not interested in art, this would be great. You see, you say, 'oh wow', you get interested. One thing leads to another. You dig deeper ..."

"I learned a lot.... This is much more than just a painting. You have a chance to sit down and get the context. I like the back and forth between the painting and the context..."

"So often when I read about art I only think about what the book says. This leads you to other questions which stimulate your thinking."

"It's not overwhelming. You can chose what you want... It's impossible to sit down and look at things in a museum without something like this. This opens up information. It's easier than a book..."

Wilson's conclusion after this experiment are better expressed by the following comment from one of the visitors: "So many people come to look at paintings, but this make people think..." (26-34)

Another article from this same book, "Evaluation of Hypermedia and Interactivity in the Museum: A Constructive Approach to Instructional Design", by Andrew J. Peterson, investigates how the emergence of interactive and multimedia programs could serve as aids in art education. Peterson brings out an extremely important factor that designers should always keep in mind when developing a program such as this CD-ROM. The technology that is available for the development of interactive multimedia should be primarily seen as a tool that can be used to better deliver information and the success of a product will be invariably hindered if the quality of the content is overlooked. As the author points out, "the substantive content and instructional design of a presentation remain the crucial factors... Great video and stereo enhance good content and design but they cannot cover for bad ideas ..." (74-80)

In order to understand the basis of educational design, one must investigate the three main schools of thought which attempt to explain how the learning process takes place.

Behaviorists approach the process by looking at how people will experience the product, what elements will stimulate responses from the user, what these responses will be and what items and experiences will be effective in assuring that the goals of the project are met. Their theory is best summarized by asking the following question: "What do you want your visitors to do upon entrance and exit from your institution? What sorts of things are discriminative cues for these desired responses?" (75-76)

The main difference between behaviorists and cognitivists is that the latter group is also concerned with the mental process that takes place as an individual experiences what is being presented to him/her.

Finally, subjectivists base their theories on the Constructivist line of thought which states that "learning is more a process of constructing knowledge than merely receiving facts which produce pre-selected responses (Behaviorist) or are processed with pre-set algorithms (Cognitivist)." (75-76) The appeal and

effectiveness of the subjectivist theory is the fact that it allows users to learn through a process of discovery and by using his/her own creative ability in drawing conclusions and processing information. As a result, users become more actively engaged in the learning process thus invariably resulting in a more individualistic and personalized experience.

Peterson looks at the efforts of Omar Khayyam Moore and the Responsive Environment Programs (1969, 1980) in explaining and understanding the essence of instructional design. One of the principles that Moore and his colleagues have used to explain instructional design is that of productivity. The translation of this principle into our presentation is probably one of the most important aspects of the Destination-Imagination CD-ROM since it states that “when one experiences an exhibit, one should learn information or procedures which help in future situations.” (77-78) This line of thought was one of the main goals in the production and creation of the CD-ROM in that the concepts learned by its users should be easily applicable in any other situation where their newly acquired knowledge of art would enhance their experience.

As Susan Peters has stated in an interview to Alice Tedeschi posted on the World Wide Web: "... what we want people to walk away with is a sense of their own skills with the looking experience.... so they can leave this room and go out into the museum, go out into the world, and look with greater skills we've given them. It's really like a pocket visual dictionary of terms that they can use." She continues by saying that "I hope what people have in this space is an experience that opens up the processes of looking for them, that they then feel equipped and more comfortable with standing in front of a painting, looking at it a bit longer than they would look otherwise." Peters finally adds that "If you give a work of art a chance, the art slowly through time will reveal wonderful treasures to you ..."

Another good source of reference material on how multimedia is being used in museums are the Proceedings of the Sixth International Conference of the MDA and The Second International Conference on Hypermedia and Interactivity in Museums (ICHIM '93). In an article titled "Interacting with Works of Art — With and Without Computers", Alex Morrison investigates how computers can help art historians and museums communicate with their visitors. He states that interactive

multimedia “can represent the kind of mental interaction which takes place in the imagination of someone in front of an art work and thus help people learn what to do to enjoy art more fully.” (179) He concludes by stating that the effectiveness of this new approach to art history is that it allows the user to have control over the pace and path of a lesson, making for an environment where he/she may feel closer to the very essence of understanding the creative process.

Stephanie Eva Koester, in a research titled Interactive Multimedia in American Museums explores how interactive multimedia can be used in museums as teaching aids to visitors: “By immersing the visitor in exhibit experiences and activities, giving them greater control and more options for exploration, visitors discover that fun can also mean learning. Interactivity, in all of its forms, is increasingly seen as the true key to enhancing learning for the museum visitor.” (179) It becomes obvious that art museums can benefit greatly from the use of multimedia interactive presentations in helping to facilitate and enhance the visitor’s experience at the museum. In order for someone to fully experience a visit to an art museum, some background knowledge in art history is often required. This, combined with the fact that

most museums are intimidating to the general public, has often kept people away from visiting museums. With the introduction of computers in museums, visitors are given the tools which help them absorb all that is presented to them which, in turn, results in a greater pre-disposition from visitors to go to museums in the future.

After reviewing articles and books on visual design, user-interface design and how museums are using interactive multimedia, a few CD-ROMS were also analyzed for benchmarking purposes regarding how others had solved some of the problems presented by this thesis.

The CD-ROM, With Open Eyes. Images From the Art Institute of Chicago, a product targeted to children, is an introduction to the art works in the Art Institute of Chicago. The presentation is visually appealing and the screen is dominated by beautiful icons which seem quite appropriate for children. The large icons are easy to click on, especially for younger children who may not have fully developed their motor skills. The size of the icons also makes it possible for this presentation to be used on a kiosk with a touch screen by reducing the rate of errors. The color choice works well

from a visual design standpoint but may be too dark for children, as the use of the dark wood texture may remind them of “stuffy” libraries or galleries where they are not allowed to touch anything. Effective features such as showing the scale of objects and positioning them on a timeline are very helpful. Extra information about a piece of art can be accessed though it is only provided through narration. This can be helpful for smaller children but can become tedious for older users who may just want to read the text themselves. The fact that most instructions and information are delivered through sound also makes it impossible for users with hearing disabilities to take full advantage of the content of this CD-ROM.

The viewing of the art work is often made more interesting through the use of puzzles and games although they become repetitious over time. Overall, With Open Eyes is very effective and could be considered to be one of the best in the market at the time it was launched.

The Louvre Museum. Museums of the World for Kids! was also designed by Voyager as was With Open Eyes. Many similarities can be found between the two products, but overall The Louvre

Museum is not as interesting and successful as the first CD. One of the improvements is that information about the pieces can now be displayed as written text, making it more accessible to all. On the other hand, instructions and help are only provided through audio, thus impeding the hearing disabled in fully understanding how the CD works. The same icons are used on this presentation, this time against a light background. Even though the screen seems livelier, the screen elements do not seem to be well integrated into the overall layout.

The quality of the graphics and of the images is far inferior to that of With Open Eyes, possibly due to the use of 8-bit color images on The Louvre Museum CD. This may help the presentation's speed but the dithering on the images seems to be a great compromise, especially when dealing with works of art.

PROCEDURE

The project was created using Power Macintosh computers, flatbed and slide scanners, Kodak PhotoCDs, a Kodak DC50 Digital Camera and a Mac microphone for recording sound. Images were created and edited with Adobe Photoshop 3.0 and the presentation was created using MacroMedia Director 4.0. All three-dimensional renderings were created using Strata StudioPro 1.5.2. Sound was recorded and edited on Sound Edit 2. Adobe Illustrator was also used to create graphics and lay out text. The project was stored on Iomega zip disks, a 2 gigabyte external drive and on recordable CDs.

The creative process will be presented by following the six steps for creating interactive presentations as described earlier. These steps were cited by Tom Wujec in his paper "Multimedia Interface Design" for the Sixth International Conference of the MDA and The Second International Conference on Hypermedia and Interactivity in Museums (ICHIM '93).¹⁵

1. *Determine the scope and purpose of the interactive presentation*

During our first meeting with Susan Peters, Director of Education at the Memorial Art Gallery and Gordon Goodman, Professor of Information Technology at the Rochester Institute of Technology, the following statements about the project were agreed upon:

- The CD-ROM should serve as an introduction to the Memorial Art Gallery for children. It should act as a pre-visit tour and introduce the user to basic concepts of art.
- The overall experience should be fun. It should help children find museums less intimidating by familiarizing them with the collection and by providing them with some knowledge for appreciating works of art.
- The CD-ROM could be sent to schools where it could be used in a classroom setting by a group of people and/or be available at a media center where a single person could be use it.
- A number of pieces from the museum collection would be selected to be showcased on the presentation.
- Two works or more would be chosen to serve as instructional aids for the lessons on art concepts.
- Extensive testing with children and educational experts would be done to ensure the quality of the product and determine if the main objectives had been met.

Following this meeting, we researched the area of elementary art education for kids in order to determine the depth of information that would be appropriate for this audience. It was decided that each piece in the tour would be accompanied by a short paragraph including the work's title, artist's name, date and relevant facts about the work.

Two paintings were chosen for the lesson area: Boomtown (Figure 1) by Thomas Hart Benton and Ruby Gold (Figure 2) by Hans Hofmann. By analyzing these two paintings, we were able to determine which basic elements and concepts of art education we would focus on during the lessons.



Figure 1. Thomas Hart Benton, Boomtown



Figure 2. Hans Hofmann, RubyGold

2. Know the Visitor

Step two was accomplished by following and observing a group of sixth-graders who came to visit the art gallery. By watching their behavior and reaction to the pieces in the gallery, we gained a greater understanding of several key elements that affected our creative decisions:

- This happened to be the first visit to an art gallery for many of the children and the austere atmosphere seemed a little intimidating to most.
- A part of this apprehension towards their “museum experience” was due to their lack of knowledge in the areas of art and art history.
- Those children who had been previously exposed to art history were able to enjoy the visit more and were not so hesitant about asking questions and making comments.
- Once the docent, or tour guide, gave the children some facts about a work of art, they seemed much more predisposed to find out more about it. As the tour progressed, they were able to increasingly develop their observation skills.

3. Information Design

Following this visit, Kristine and I engaged in several brainstorming sessions trying to determine interesting ways and metaphors in which the material could be presented. After evaluating some of our concepts with Susan Peters, it was agreed that certain factors would be used in the presentation:

- Some hidden hot spots would be incorporated in parts of the tour where the child may be able to get a closer view of a detail

element of the artwork. For example, Rachel Ruysch's Floral Still Life (Figure 3) is full of animals that may not be visible at a first glance or at a smaller scale. By rolling over these areas with the mouse, enlarged views of some of these elements would pop up, adding interest to the presentation.



Figure 3. Rachel Ruysch, Floral Still Life

- The lesson part should be highly interactive and the users should accomplish most of their learning by manipulating aspects of the paintings and then drawing their own conclusions based on the given information. For example, some color theory would be discussed in conjunction with Hans Hofmann's Ruby Gold. The user would then be able to select a "game" where he/she may see

how the artist used certain colors in the painting and reach his/her own conclusions about the artist's choices and technique.

Based on the information that the gallery wanted to provide regarding Hofmann and Benton and about their works, the lesson section was divided into four parts: *The Artist's Story* (the painter's biography), *What's the Big Idea?* (historical facts associated with the work and time context), *What's Happening* (the work's main elements), and finally, *Get Smart About Art* (lessons on art concepts).

It was determined that the tour section would be comprised of different categories from which the user could choose in order to view the pieces: Portraits of Famous People, Animals In Art, Art from Around the World, Pictures of Children, Artists' Materials, Puzzling Pairs, and Favorite Places of Famous Artists. Some paintings would appear in more than one category while others could only be accessed from one of the above categories (Figure 4).

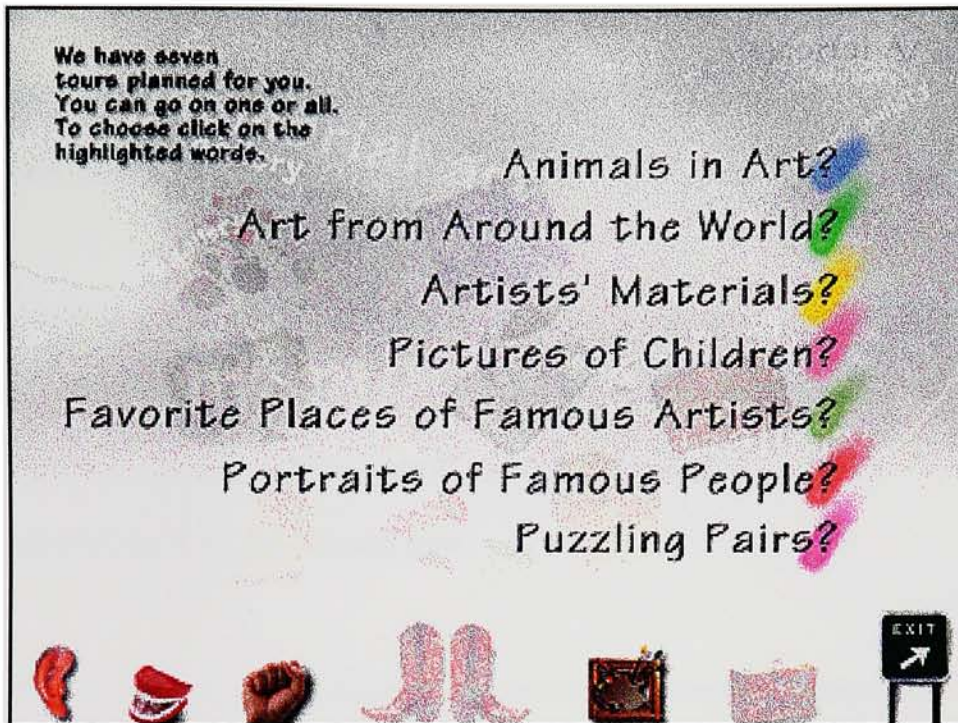


Figure 4

4. *Integrate text, images, video, and sound*

This was probably the most time consuming step on the entire process. We began by making a list of qualities or characteristics which we wanted to focus upon while designing the overall look of the product:

- It should be fun and appropriate for the audience without being too “cartoonish”.
- The works of art should be the primary focus on the screen; consequently the screen layout needed to be clean and uncluttered.

- The overall look should be elegant to reflect the museum's qualities, but certainly not stodgy. Rather, it should be appealing and inviting.

A list of tasks was created in order to determine what navigational elements should be present on the screens and were finally narrowed down to help, sound volume, narration, forward, backward, tour, lesson and quit.

A decision was then made to use realistic photographic icons for the navigation in order to add a sense of depth to the screen design. Brainstorming sessions followed to determine what icons would be appropriate for which tasks (Figure 5). We finally agreed on using a hand with a question mark for help, chattering teeth for turning narration on and off, an ear for adjusting the volume of the sound, cowboy boots for moving forward and backward, a suitcase for the tour, a picture frame for the lesson area, and an exit sign for quitting (Figure 6).

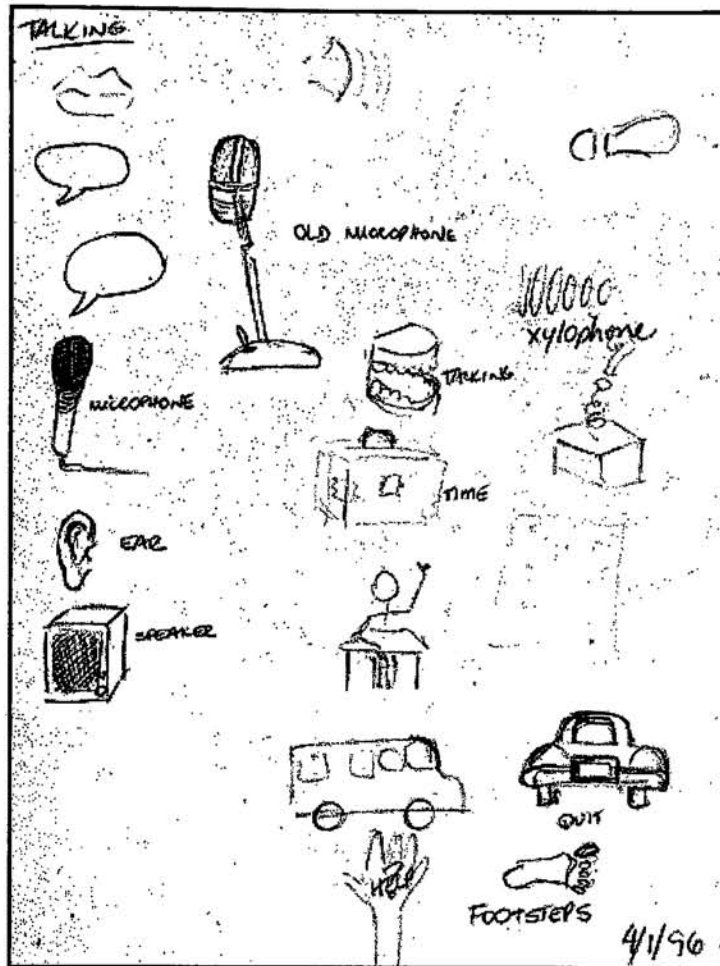


Figure 5



Figure 6

The images for the icons came from stock photography CDs which were cropped, resized and manipulated until we were satisfied with their look and integrity. They were then imported into a blank screen on MacroMedia Director and randomly placed across the bottom of the screen. Due to the richness of their colors and their photographic qualities, it was decided that the background image would be a light gray fading into white toward the bottom in order to create a white area for the icons. Kristine then developed a grid that was used throughout the entire presentation for placing and distributing elements around the screen.

The realistic look of the icons made them appealing to interact with and it seemed almost natural that they should be somehow "brought to life". It was then decided that when the cursor was placed on top of an icon, it would animate and play a sound serving both as feedback for the user as well as an added point of interest.

Each icon was manually animated by moving, rotating and distorting different pieces of the object in Adobe Photoshop. The icons were then brought into Director and a script was written so that they would animate every time someone rolled over the icon

with the cursor. Most of the icon sounds were then recorded from sound effects CDs.

The overall layout of a screen for the tour was then designed, integrating text, image and the navigational elements based on Kristine's grid (Figure 7). The same approach was used for the lesson aspect and another layout was created which indicated where text and image would be positioned (Figure 8). Next, a flowchart was created, outlining the main screens for each section in order to determine how the navigation would take place (Figure 9).

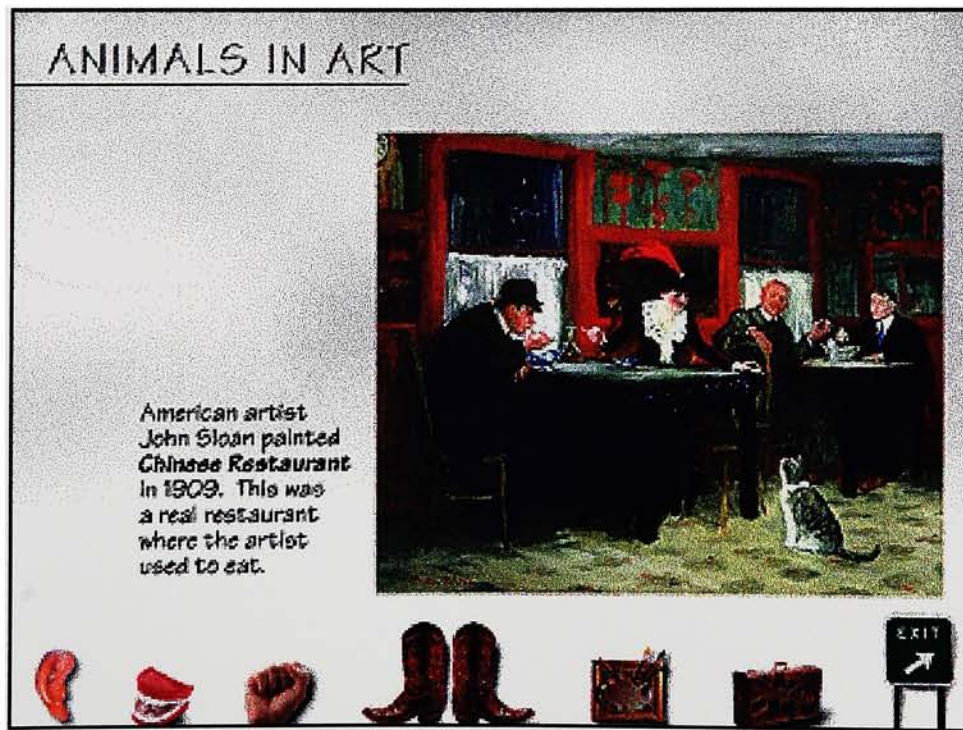


Figure 7

BOOMTOWN

WHAT'S THE BIG IDEA?



Thomas Hart Benton painted *Boomtown* during a "boom time" for the entire United States. People were excited about the future of America and making their own fortunes. The discovery of oil was always an exciting event. It meant new jobs for many and great wealth for some. Oil was so important because it provided fuel for the major new means of transportation - the automobile.

Figure 8

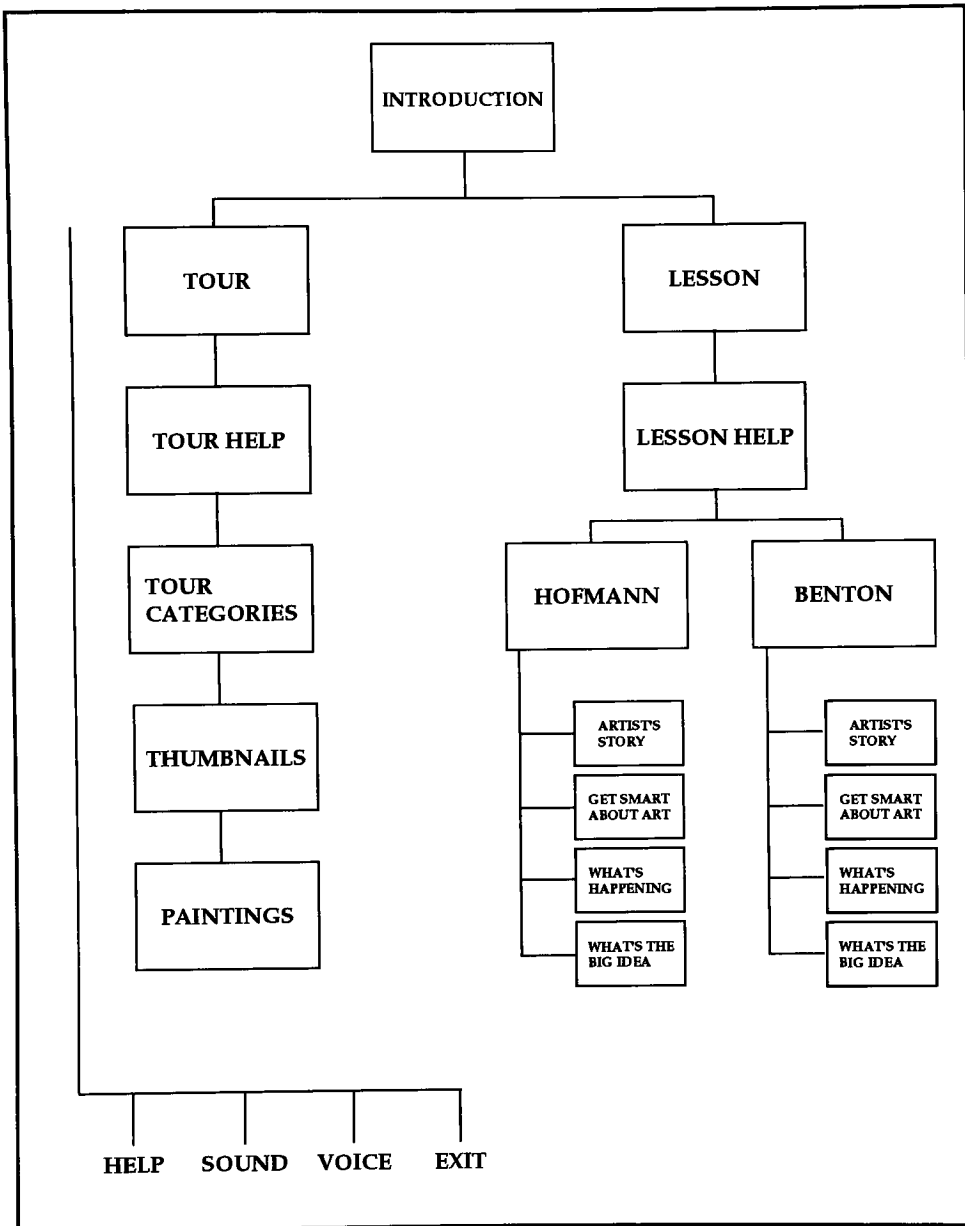


Figure 9

Below is a brief description of the content of each “template” screen and how the navigation was designed:

TOUR

By clicking on the suitcase, the user would go to a screen with a list of the different categories that were available for the tour.

Upon choosing a category, a screen with different thumbnails for that category would appear (Figure 10). By clicking on a thumbnail, another screen with a larger version of the painting, together with information about it, would be displayed. If the user clicked on the boots, he/she would go to the previous or next category.



.Figure 10

At this point, different paths could be taken to navigate through these screens:

- clicking on the painting itself would take the user back to the thumbnail screen;
- clicking on the boots would take the user to the next or previous painting in that category;
- when the user reached the last painting in that category, the right boot would go to the thumbnail screen for the next category.

If the user clicked on the left boot while looking at the first painting of a category, the user would go to the thumbnail screen of the previous category.

On each screen where text appeared, the user could click on the chattering teeth to hear it spoken out loud. The narration could be stopped at any time by moving the mouse away from the chattering teeth.

OTHER ICONS

EAR (volume control) — Clicking on the ear would take the user to a screen where he/she could adjust the volume of the sound (Figure 11).

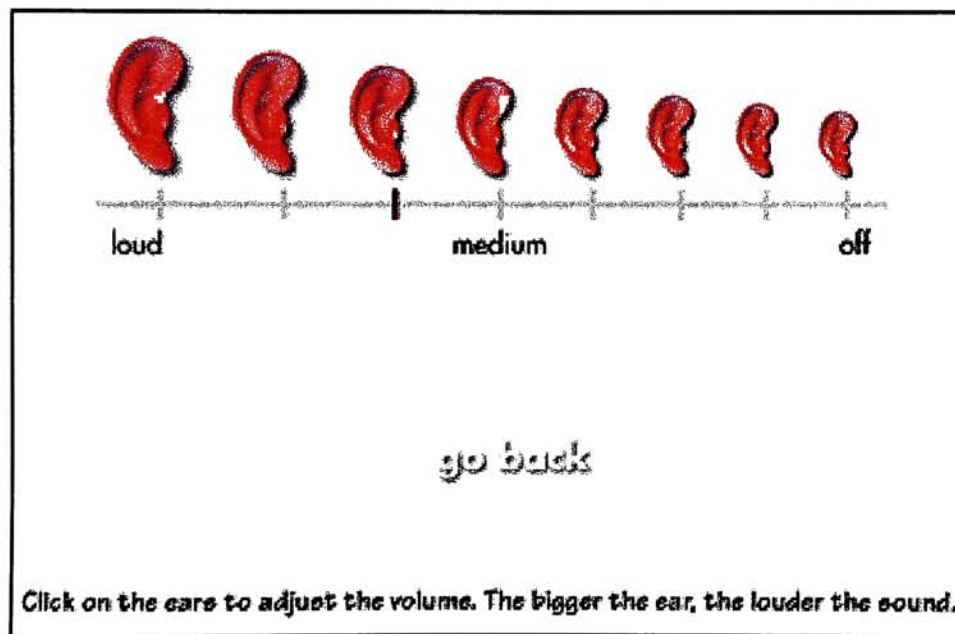


Figure 11

TEETH (narration) — Turns narration on/off

HAND (help) — Takes the user to a help screen where more information about the elements on the page could be found by rolling over the desired area. For the tour part, two different help screens were created: one for the thumbnail screens and one for the enlarged view of the painting screens. It was decided that the help screen would be displayed when the user entered the tour for the first time (Figure 12).

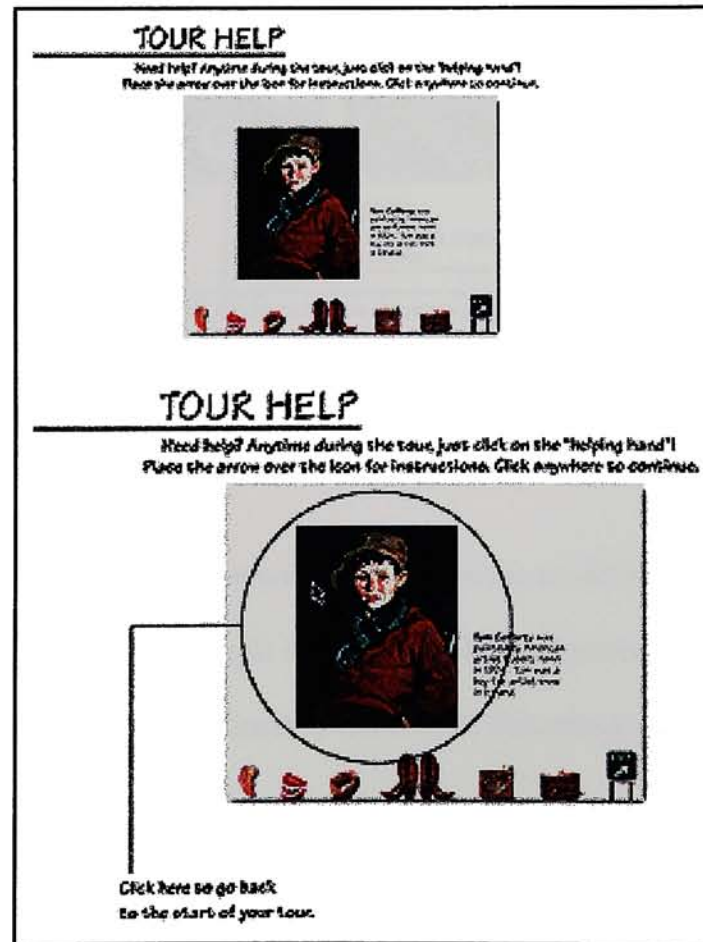


Figure 12

The same approach was used for the lesson section where the help screen, explaining how to navigate in that section, was displayed before the user entered that area (Figure 13).

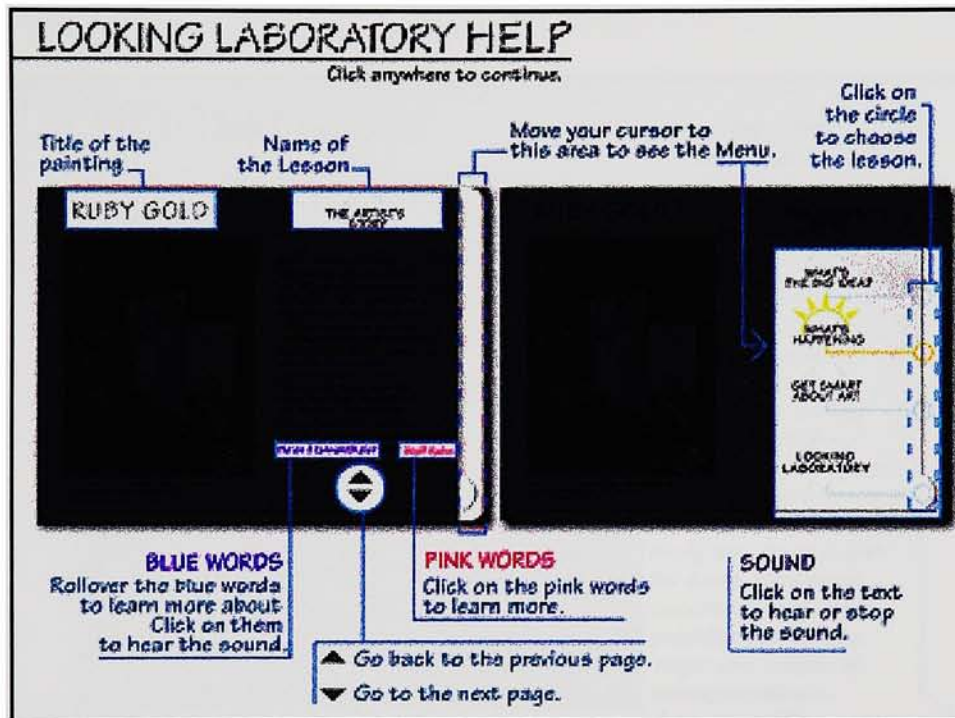


Figure 13

BOOTS (backward and forward) — The boots could be used if one wished to navigate through the tour in a linear fashion. Its behavior in different sections of the tour is described above.

PICTURE FRAME (lesson menu) — By choosing this icon, the user would be taken to the introductory screen of the lesson area where the user could choose from the two paintings displayed - Boomtown and Ruby Gold (Figure 14).

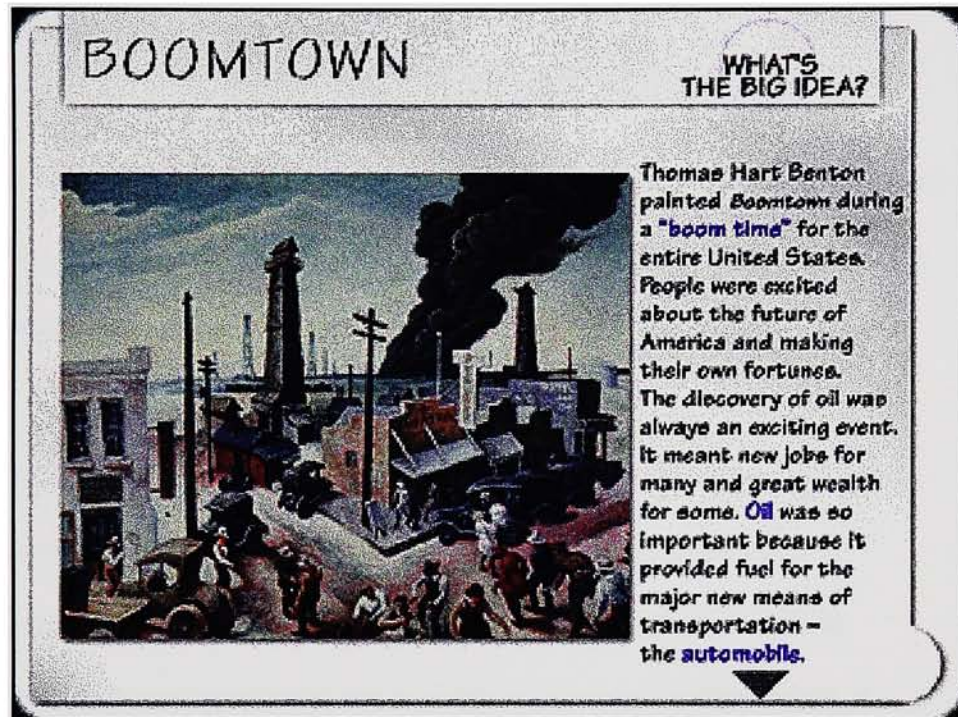


Figure 14

SUITCASE (tour) — This icon would take the user to the categories screen for the tour

EXIT (quit and credits) — This takes the user to the credit section. The user can then navigate through the credits or click on the exit sign again to quit the presentation.

LESSON

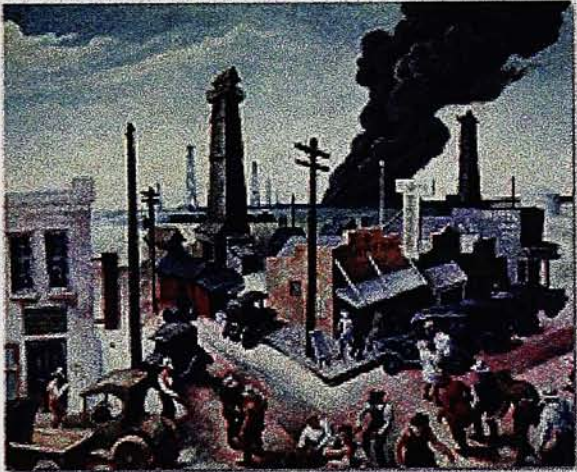
All areas within the lesson section could be displayed by moving the mouse over to the white bar on the right edge of the screen, where all the options would then be displayed. The user could then click on the desired section and move the mouse away from the white bar to view the screen.

It was decided that narration would automatically start every time the user went to a new screen and that it could be stopped at any point by clicking on the text.

In order to make these screens more interactive and educational, some words or terms were selected from within the copy to provide additional information. By rolling over blue words (clicking on one would turn on the narration for that term), a definition of the word and how it related to the painting would be displayed. Magenta was used for words that were clickable and would take the user to a new screen with a lesson about that term or concept (Figure 15).

BOOMTOWN

WHAT'S THE BIG IDEA?



Thomas Hart Benton painted *Boomtown* during a "boom time" for the entire United States. People were excited about the future of America and making their own fortunes. The discovery of oil was always an exciting event. It meant new jobs for many and great wealth for some. Oil was so important because it provided fuel for the major new means of transportation - the automobile.

Figure 15

INTRODUCTORY SCREENS

The introductory screens were also outlined and it was decided that the presentation would begin with the gallery's logo, followed by the logo of the companies who were funding this project. The next screens would consist of an animation with introductory text, narration and background music. The final screen would be the "The Looking Laboratory" where one could either choose to go on a tour or take a lesson (Figures 16 and 17).

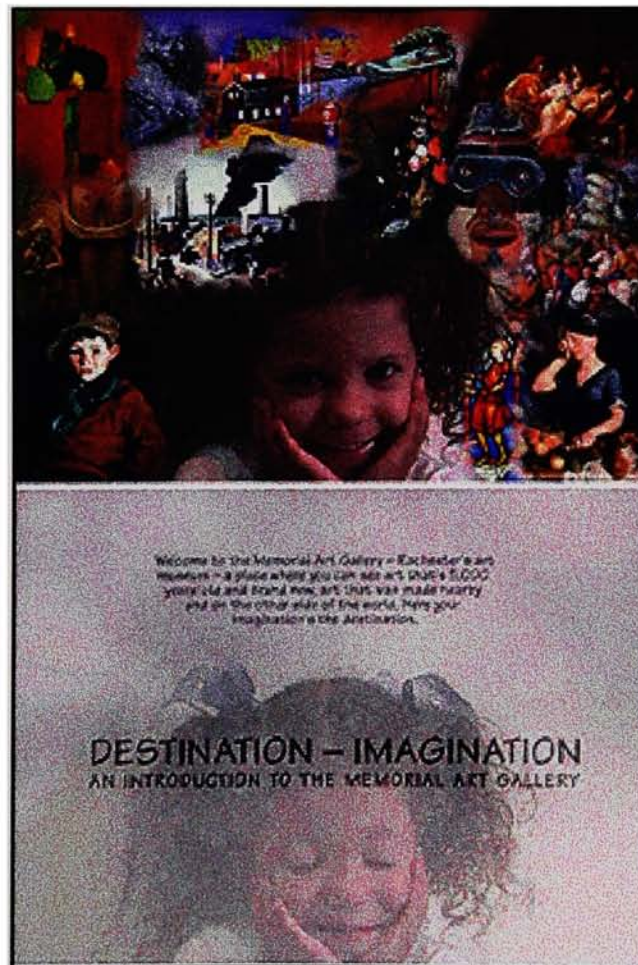


Figure 16

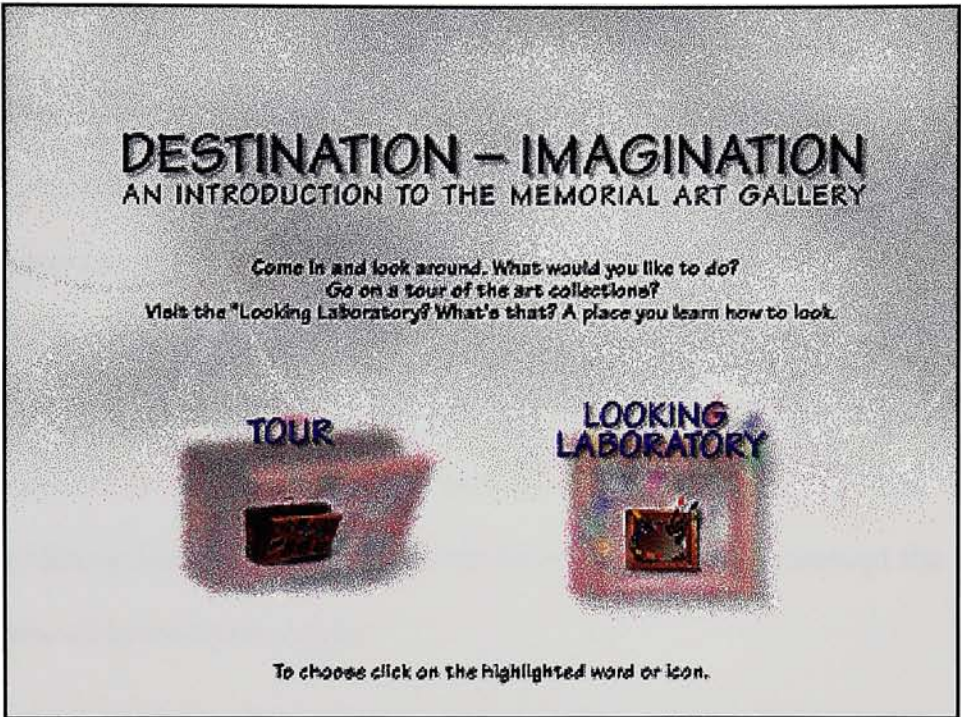


Figure 17

This concludes step five of Wujec's model, where the designers must decide *how users will navigate through the presentation*.

PREPARING CONTENT

We initially determined that the movie would be created in Thousands of Colors to maintain the visual quality and integrity of each work of art. Creating an 8-bit color presentation was also considered due to its advantages as far as file size and performance, but too many pieces were being showcased and several custom palettes would have had to be created. As a result, it would be necessary to add a transition when switching palettes which would not only become repetitious, but would interrupt the flow between each screen.

Susan Peters, together with some of the gallery staff, was responsible for providing us with all the copy that would appear with each picture or section. The text files were created on Microsoft Word and provided to us either on a floppy or as an email attachment. We then copied and pasted the text on Adobe Illustrator, where the typeface was selected — we decided to use Tekton since it has an appropriate look for children and the text was formatted according to the grid specifications. The text was

then copied into Adobe Photoshop where it was anti-aliased and, finally imported into Director.

Background screens were also created in Photoshop and brought into Director as 32-bit images — we noticed that changing the graphic to 16 bits in Director itself resulted in better looking gradients.

For the paintings themselves, slides and transparencies were scanned and saved on a Kodak PhotoCD. Each file was then opened in Photoshop using the Kodak PhotoCD acquire plug in to ensure highest quality. The images were cropped and resized to the dimensions that had been specified earlier. Then each image had to be color corrected to ensure the best accuracy in comparison to the original. For this procedure, I used the gallery's printed catalog as a reference and tried to visually match the color saturation, brightness and contrast, and hue of each painting to the printed image in the catalog.

SOUND

It was decided that different people would record sound for certain areas so as to add variety to the presentation. A child was

used for the top level screens and for some of the instructions. A voice-over professional was responsible for reading the text that went along with each painting on the tour section. Finally, a third person read the text on the lesson section. A Macintosh microphone was used to record all the sound which was then edited with SoundEdit Pro.

PROCEDURES ON SPECIFIC AREAS/SCREENS OF THE SITE

The Memorial Art Gallery logo was created and rendered on Strata StudioPro where the final animation was saved as a PICS file. The frames were then imported into Director and placed in the appropriate channels to create the animation sequence (Figure 18).

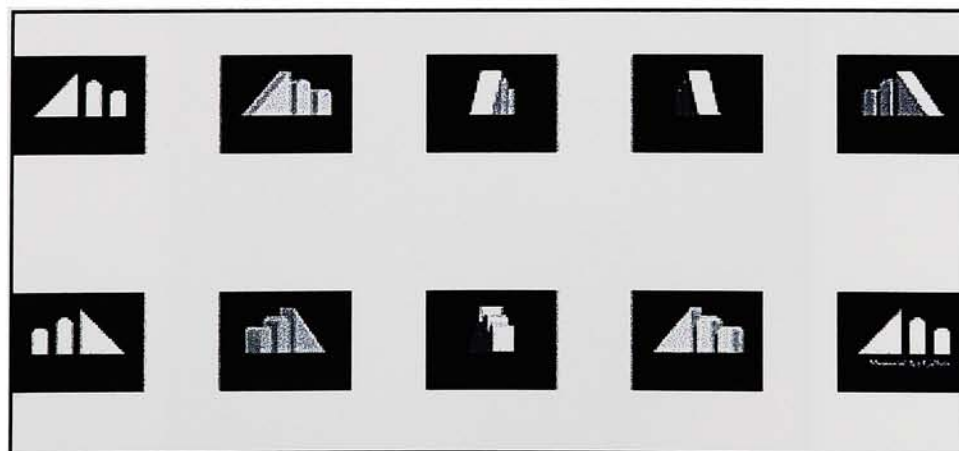


Figure 18

The animation sequence with the little girl at the introduction was assembled on Photoshop. Pictures of the girl with different facial expressions were taken with a Kodak DC50 Digital Camera and downloaded directly into the computer. A collage was then created in Photoshop, combining the pictures of the girl with some of the paintings from the gallery. The transparency setting in Director was then used to create the transition from one screen to the next (Figure 19).

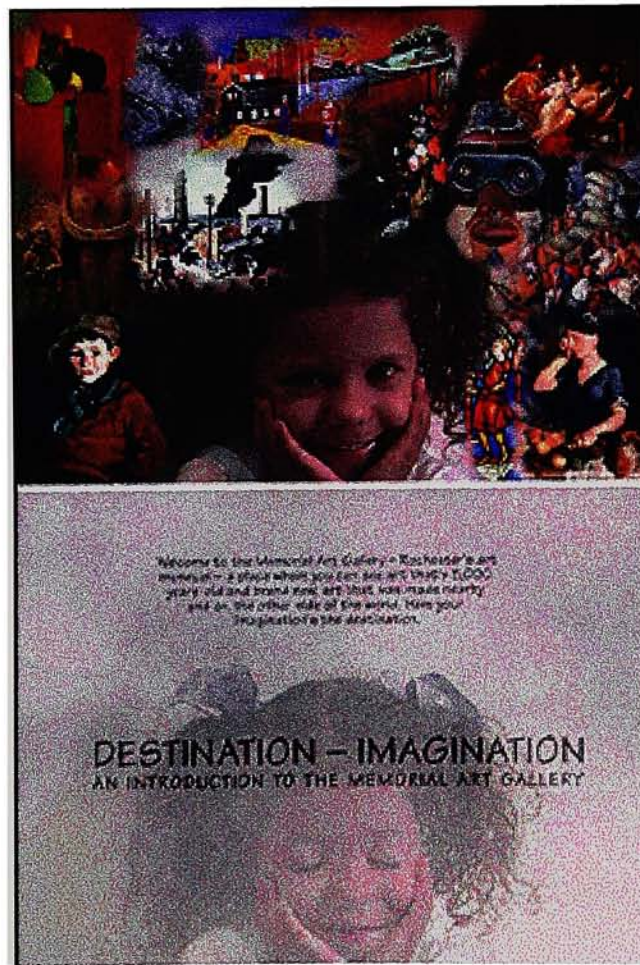


Figure 19

LESSON

On the screens where the user had the choice of rolling over a blue word to find out more about that term, a consistent approach was taken in displaying its definition. The area of the painting that was being referred to was left untouched while everything else was darkened (Figure 20).

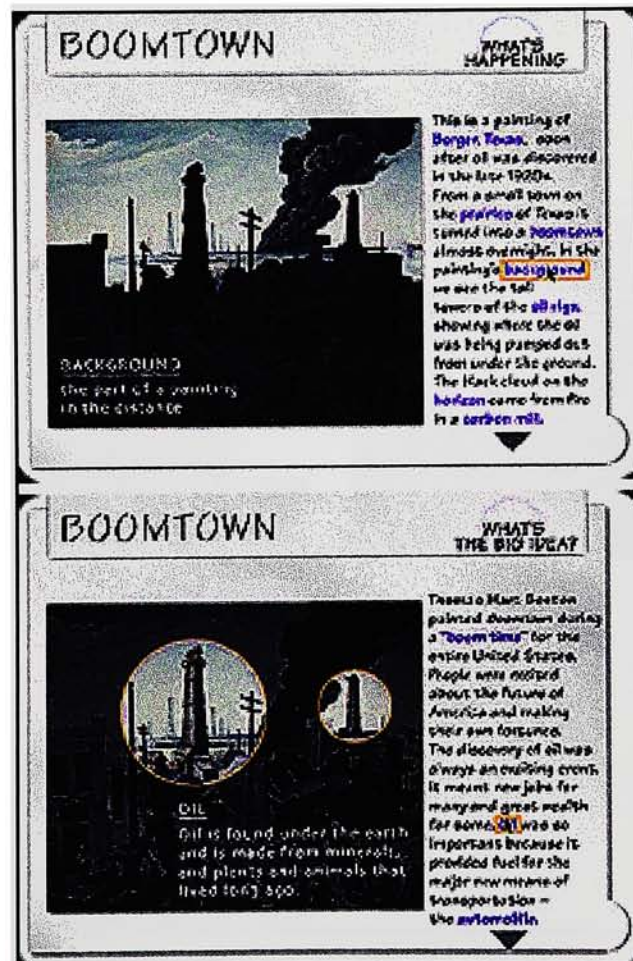


Figure 20

One of the main advantages of using a computer as a teaching aid is the use of simulation. In order to demonstrate how the perspective of a drawing is affected by the artist's point of view, Boomtown was reconstructed in Strata Studio Pro, a 3d modeling program. Textures were sampled from the painting and mapped on the appropriate elements of the model. Three different renderings were then generated with the camera placed lower or higher to simulate the change in the point of view (Figure 21).

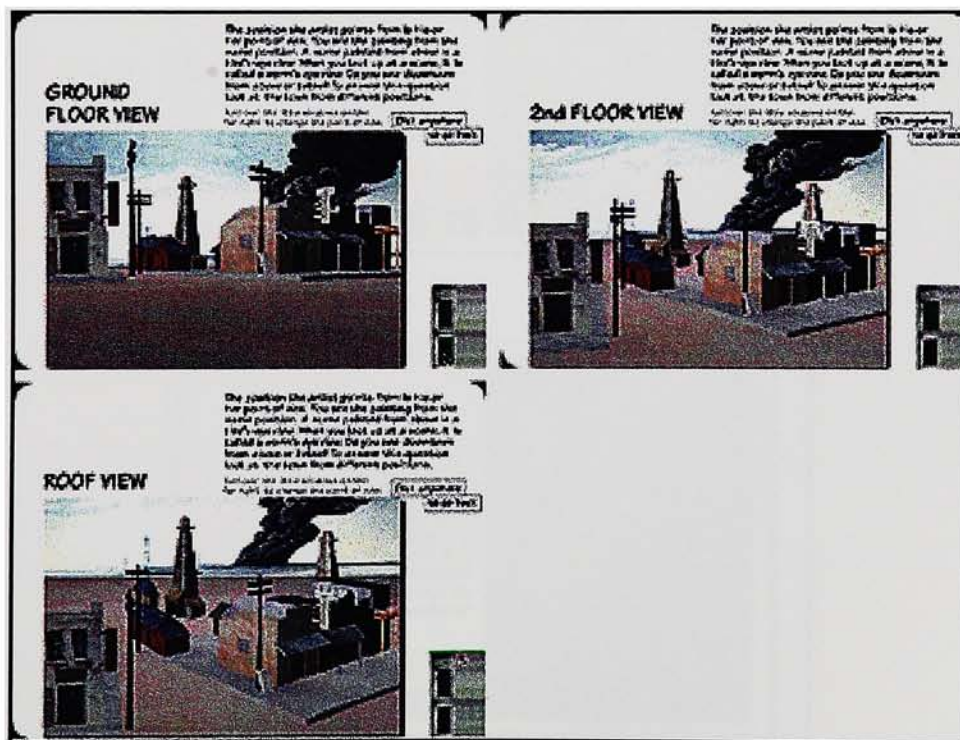


Figure 21

For Ruby Gold *What's Happening* game, different versions of the painting were saved in Photoshop to demonstrate the use of each color. For example, for the color red, all main areas on the painting where the artist had used red were masked and the remainder of the painting was turned into a grayscale so as to highlight only the areas of red (Figure 22).



Figure 22

Ruby Gold *Design your Own Abstraction* game was created entirely with lingo and quickdraw shapes in Director (Figure 23). The objective of this game was to enable the user to create an abstract painting so that he or she could gain an appreciation for abstract art.

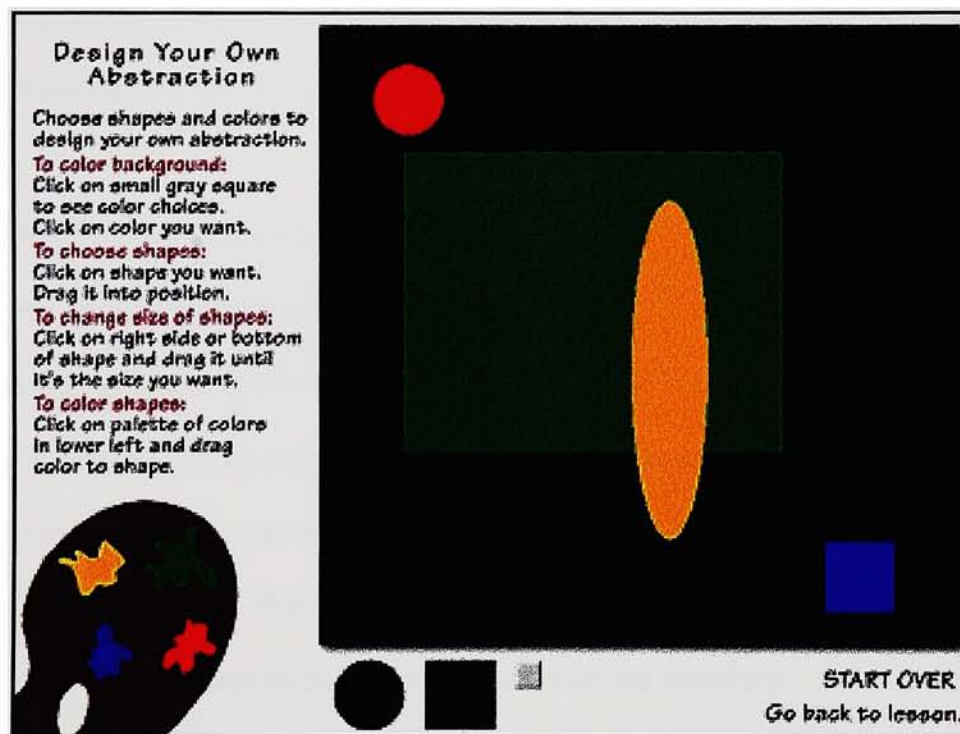


Figure 23

Finally, the sixth step described by Wujec consists of *Testing and Revising* and is one of the most important parts of the creative process. Extensive testing for bugs in the presentation was done as each piece was created and then again when the different parts were integrated to ensure that everything worked together. Classmates and friends were also used for the initial testing period to determine whether the interface was intuitive to most people.

When most of the presentation pieces were assembled and the navigation was stable, a test was done with volunteers who were representative of the target audience. By following Professor Goodman's suggestion, we chose to use a special testing method where the user should say out loud what they were expecting to accomplish with their next action before actually performing the task. This helped in determining whether the interface corresponded to the user's expectations of how the navigation should behave. This test was videotaped and later used for reviewing and revising the presentation. From this experiment, we were also able to conclude that the icons were successful with

most children and very helpful in sparking the interest of younger children in the presentation. We also observed a common tendency with children: they clicked everywhere on the screen.

Consequently it was necessary to make certain that the presentation would not "crash" if anyone clicked on the wrong spots.

After a beta version of the CD-ROM was created, additional testing was done by teachers and experts in the area of art education. As a result of their feedback, certain areas and parts of the text were edited: the descriptions of the paintings and the help screens were simplified and reworded when necessary so that they would be more compatible to the age level of the CD's audience. This was especially true of the instances where instructions were given to the children on how the presentation worked.

CONCLUSION

By following the main steps in the production and design of multimedia presentations, the two main objectives of this project were met: to create a CD-ROM that both educates children about art and lets them have fun while learning. It became apparent during the creative process that all steps must be regarded as equally important and that if any is neglected, the end results can suffer greatly.

The steps involved in the creation of this presentation can be clearly divided into six: defining the purpose and scope of the project, determining the intended audience, dividing and grouping the information to be presented, developing the several elements that constitute the presentation, designing a user interface model, and finally, testing and refining the product. One of the main lessons learned from the completion of this project was that the completion of each one of the steps listed above ensured that the final product would be successful in all its aspects and that the objectives of the project would be met.

Although all sections of the presentation were of equal importance, certain areas seemed to be more successful while others could have been improved. The interactive games, especially those that allowed the user to create something, such as Hofmann's *Create your Own Abstraction*, were exceptionally popular with most users. In addition, the use of simulation proved to be extremely effective in demonstrating concepts such as the use of color and perspective.

In the other hand, as a result of the testing that was conducted, it became apparent that the tour could have been more interactive and engaged the users more to explore each painting. The addition of more hidden spots where the user could rollover to see an enlarged view of an area of the painting would have helped to trigger the user interest.

The overall experience in the creation of this CD was very positive and there are very few aspects that could have been better if handled differently. Being able to work with Kristine Hwang was

an extraordinary experience as she helped me look at problems from different perspectives; therefore, finding more creative and cohesive solutions. Also, the ability to interact with children during our tests helped me gain insights into how their minds operated thus enabling me to judge the appropriateness of each area and element of the project.

These are some of the main scripts used in the CD-ROM.

-- These are scripts from the shared.dir file

Movie Script

```
--soundlevel
on keydown
  global whichkey, currsound, whichkey2
  put the key into whichkey
  put the keycode into whichkey2
  put the soundlevel into currsound
  if whichkey = currsound then nothing
  if whichkey = 0 then set the soundlevel to 0
  if whichkey = 1 then set the soundlevel to 1
  if whichkey = 2 then set the soundlevel to 2
  if whichkey = 3 then set the soundlevel to 3
  if whichkey = 4 then set the soundlevel to 4
  if whichkey = 5 then set the soundlevel to 5
  if whichkey = 6 then set the soundlevel to 6
  if whichkey = 7 then set the soundlevel to 7
  if whichkey2 = 126 and currsound < 7 -
    then set the soundlevel to (currsound + 1)
  else
    if whichkey2 = 125 and currsound > 0 -
      then set the soundlevel to (currsound - 1)
  end if
end
```



```
-- ANIMATION ICONS
-- (for this situation, I'd recommend creating filmloops out
-- of the animations to simplify the script. I thought of this after we
-- were done with the project.
```

```
on iconm
  global down, tframe, tmovie
  puppetsprite 48, true
  -- HAND
  if rollover (46) then
    repeat while rollover (46)
      set the castnum of sprite 46 to 511
      updatestage
      set the castnum of sprite 46 to 509
      updatestage
      puppetsound "heartbeat", true
      if the mousedown and the frame = 2 then
        put the frame into tframe
        put the moviename into tmovie
        play movie "thumbhelp"
      else if the mousedown then
        put the frame into tframe
        put the moviename into tmovie
        play movie "help tour"
      end if
    end repeat
    puppetsound 0
  end
```

```
-- EXIT
ELSE if rollover (40) then
  repeat while rollover (40)
    set the castnum of sprite 40 to 521
    if not soundbusy (1) then
      puppetsound "exit", true
    end if
    updatestage
    --wait 7
    set the castnum of sprite 40 to 503
    -- wait 4
    updatestage
```

```
if the mousedown then
  put 1 into down
end if
```

```
if the mouseup and down = 1 then
  put 0 into down
  play movie "credits"
```

```
  updatestage
end if
end repeat
puppetsound 0
```

```
-- TEETH
else if rollover (47) then
  --repeat while rollover (47)
  set the castnum of sprite 47 to 512
  if not soundbusy (1) then
    puppetsound "teeth", true
  end if
  updatestage
  set the castnum of sprite 47 to 510
  updatestage
```

```
if the mousedown then
  put 1 into down
end if
```

```
if the mouseup and down = 1 then
  put 0 into down
  narration
  --updatestage
  if soundbusy (2) then
    set the castnum of sprite 47 to 510
    updatestage
    puppetsound "teeth", false
    --updatestage
  end if
end if
-- end repeat
```

```

-- FRAME
else if rollover (42) then
  repeat while rollover (42)
    set the castnum of sprite 42 to 550
    if not soundbusy (1) then
      puppetsound "compass", true
    end if
    updatestage
    --wait 7
    set the castnum of sprite 42 to 549
    updatestage
    --wait 7
    if the mousedown then
      put 1 into down
    end if

    if the mouseup and down = 1 then
      put 0 into down
      play movie "LessonMenu"
    end if
  end repeat
  puppetsound 0

```

```

-- SOUND
else if rollover (41) then
  repeat while rollover (41)
    set the castnum of sprite 41 to 547
    if not soundbusy (1) then
      puppetsound "dinnerbell", true
    end if
    updatestage
    --wait 4
    set the castnum of sprite 41 to 546
    updatestage
    --wait 4
    if the mousedown then
      put 1 into down
    end if
    if the mouseup and down = 1 then
      put 0 into down
    end if
  end repeat

```

```

    play movie "soundm"
  end if
end repeat
puppetsound 0

-- LEFT BOOT
else if rollover (45) then
  repeat while rollover (45)
    set the castnum of sprite 45 to 514
    if not soundbusy (1) then
      puppetsound "boot", true
    end if
    updatestage
    --wait 7
    set the castnum of sprite 45 to 508
    updatestage
    --wait 7
    if the mousedown then
      FIRSTFRAME
      --lastframe
      put 1 into down
    end if
    if down = 1 and the mouseUp then
      put 0 into down
      go marker (-1)
    end if
  end repeat
  puppetsound 0

```

```

-- RIGHT BOOT

```

```

else if rollover (44) then
  repeat while rollover (44)
    set the castnum of sprite 44 to 516
    if not soundbusy (1) then
      puppetsound "boot", true
    end if
    updatestage
    set the castnum of sprite 44 to 507
    updatestage
    if the mousedown then

```

```

    LASTFRAME
    put 1 into down
end if

if down = 1 and the mouseUp then
    put 0 into down
    go marker (1)
end if
end repeat
puppetsound 0

-- SUITCASE
else if rollover (48) then
    repeat while rollover (48)
        set the castnum of sprite 48 to 517
        updatestage
        set the castnum of sprite 48 to 502
        updatestage
        if not soundbusy (1) then
            puppetsound "suitcase", true
        end if
        if the mousedown then
            play movie "categories"
        end if
    end repeat
    puppetsound 0
else
    nothing

    puppetsound 0
end if
end

```

Movie Script

```
-- universal script for clicking on thumbnails
on thumb
  put the castnum of sprite (the clickon) into cnum
  put the name of cast cnum into where
  go to where
end

on thumb2
  put the castnum of sprite (the clickon) into cnum
  put the name of cast cnum into where
  go to where of movie "america2"
end

-- this detects whether you're on the last frame and takes
-- you either to the previous or following movie

on LASTFRAME
  if the framelabel = "1" or the frame = 2 then
    play movie "categories"
  end if
end LASTFRAME

on firstFRAME
  if the frame = 2 then
    play movie "native america"
  end if
end firstFRAME
```

Movie Script

```
-- turning narration on for each paiting
on narration
  if the framelabel = "olowe" then
    puppetsound "69",true
    updatestage
  else if the framelabel = "bamana" then
    puppetsound "70",true
    updatestage
  else if the framelabel = "senufo" then
    puppetsound "71",true
    updatestage
  else if the framelabel = "sierra" then
    puppetsound "72",true
    updatestage
  else if the framelabel = "asante" then
    puppetsound "73",true
    updatestage
  else if the framelabel = "yoruba" then
    puppetsound "74",true
    updatestage
  else if the framelabel = "1" then
    puppetsound "75",true
    updatestage
  else
    nothing
    puppetsound 0
  end if
end
```

-- this is the script for the game "Create your own abstraction"
where you use
-- QuickDraw shapes on a canvas. They can be colored and
stretched.

Movie Script

```
on startMovie
  global listA
  global n
```

```
puppetsprite (the clickon), true
puppetsprite 1, true
puppetsprite 2, true
puppetsprite 32, true
puppetsprite 33, true
puppetsprite 34, true
puppetsprite 35, true
puppetsprite 36, true
puppetsprite 37, true
```

```
puppetsprite 39, true
```

```
set the visible of sprite 4 to false
set the visible of sprite 5 to false
set the visible of sprite 6 to false
set the visible of sprite 7 to false
set the visible of sprite 8 to false
set the visible of sprite 9 to false
set the visible of sprite 10 to false
set the visible of sprite 11 to false
set the visible of sprite 12 to false
set the visible of sprite 13 to false
set the visible of sprite 14 to false
set the visible of sprite 15 to false
set the visible of sprite 16 to false
set the visible of sprite 17 to false
set the visible of sprite 18 to false
set the visible of sprite 19 to false
set the visible of sprite 20 to false
set the visible of sprite 21 to false
```



```

set the visible of sprite 22 to false
set the visible of sprite 23 to false
set the visible of sprite 24 to false
set the visible of sprite 25 to false

set listA = [4,4,4,4,5,6,7,8,9,10,↵
            11,12,13,14,15,16,17,18,19,20,21,22,23,24,25]
put 0 into n
end

-- creating shapes
on listm
  global n
  global listA

  puppetsprite (the clickon), true
  if n < 4 then
    put getAt (listA,1) into n

    return n
    puppetsound 0
  end if

  if n = 25 then

    puppetsound "outof"
    else if 4 <= n < 24 then

      put getAt (listA,n+1) into n
      put n

      return n
      puppetsound 0
    end if
  end
-- setting the size and color
on sizem
  global gPicts
  global siz
  global n

```

```

puppetsprite n, true

set the visible of sprite n to true
--set the moveablesprite of sprite n to true

set the castnum of sprite n to -
    the castnum of sprite (the clickon)

set the width of sprite n to -
    the width of sprite (the clickon)

set the height of sprite n to-
    the height of sprite (the clickon)

set the forecolor of sprite n to 248-
    --the forecolor of sprite 205

set the loch of sprite n to 200
set the locv of sprite n to 50
end

-- stretching sprites
on stretchm
    global mh
    global mv
    global cur
    global oloch
    global olocv

    put the loch of sprite (the clickon) into oloch
    put the locv of sprite (the clickon) into olocv

    if (the right of sprite (the clickon) >= the mouseh) and -
        (the mouseh > the right of sprite (the clickon) - 5) and -
        (the top of sprite (the clickon) < the mousev) and -
        the bottom of sprite (the clickon) > the mousev then

        repeat while the stilldown
            put the mouseh into mh
            put the mousev into mv

```

```

cursor [45]
put 45 into cur
spritebox (the clickon), oloch, olocv, mh, mv
updatestage
end repeat
else if (the left of sprite (the clickon) <= the mouseh) and ¬
    (the mouseh < the left of sprite (the clickon) + 5) and ¬
    (the top of sprite (the clickon) < the mousev) and ¬
    the bottom of sprite (the clickon) > the mousev then

repeat while the stilldown
put the mouseh into mh
put the mousev into mv

cursor [45]
put 45 into cur
spritebox (the clickon), oloch, olocv, mh, mv
updatestage
end repeat
else if (the bottom of sprite (the clickon) >= the mousev) and ¬
    (the mousev > the bottom of sprite (the clickon) - 5) then
repeat while the stilldown
put the mouseh into mh
put the mousev into mv
cursor [46]
put 46 into cur
--set the height of sprite (the clickon) to mv - the top of sprite
(the clickon)
spritebox (the clickon), oloch, olocv, mh, mv
updatestage
end repeat
else if (the bottom of sprite (the clickon) >= the mousev) and ¬
    (the mousev > the bottom of sprite (the clickon) - 5) then
repeat while the stilldown
put the mouseh into mh
put the mousev into mv
cursor [46]
put 46 into cur
--set the height of sprite (the clickon) to mv - the top of sprite
(the clickon)
spritebox (the clickon), oloch, olocv, mh, mv

```

```

    updatestage
end repeat
else
    set x = the mouseh - oloch
    set y = the mousev - olocv

    repeat while the stilldown
        set the loch of sprite (the clickon) to the mouseh - x
        set the locv of sprite (the clickon) to the mousev - y
        --      set oloch to the mouseh
        --      set olocv to the mousev
        updatestage
    end repeat
    set oloch = the loch of sprite (the clickon)
    set olocv = the locv of sprite (the clickon)

end if
end

```

Sprite Script

```

-- background color
on mousedown
    set the cursor of sprite (the clickon) to [557,558]
    col
end

on mouseUp
    set the cursor of sprite (the clickon) to [555,556]
    cursor -1
    resetcol
end

```

Movie Script

```
-- setting color swatches to moveable
on col
  global colh
  global colv
  put the loch of sprite (the clickon) into colh
  put the locv of sprite (the clickon) into colv
  repeat while the stilldown

    set the loch of sprite (the clickon) to the mouseh
    set the locv of sprite (the clickon) to the mousev
    updatestage
  end repeat

end

-- resetting location and color
on resetcol
  global colh
  global colv
  global m
  global listA

  puppetsprite 2, true

  repeat with m=1 to 25
    put getat(lista,m) into ashape

    if sprite (the clickon) intersects ashape then
      set the forecolor of sprite ashape to ¬
        the forecolor of sprite (the clickon)
      updatestage
    end if
  end repeat

  set the loch of sprite (the clickon) to colh
  set the locv of sprite (the clickon) to colv
end
```

--PullDownMenu

on pulld

set the cursor of sprite (the clickon) to [557,558]

set the loch of sprite 32 to 375

set the loch of sprite 33 to 400

set the loch of sprite 34 to 425

set the loch of sprite 35 to 450

set the loch of sprite 36 to 475

-- set the loch of sprite 37 to 500

set the locv of sprite 32 to 427

set the locv of sprite 33 to 427

set the locv of sprite 34 to 427

set the locv of sprite 35 to 427

set the locv of sprite 36 to 427

--set the locv of sprite 37 to 427

end

on pullu

set the cursor of sprite (the clickon) to [555,556]

set the locv of sprite 32 to 800

set the locv of sprite 33 to 800

set the locv of sprite 34 to 800

set the locv of sprite 35 to 800

set the locv of sprite 36 to 800

--set the locv of sprite 37 to 800

end

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