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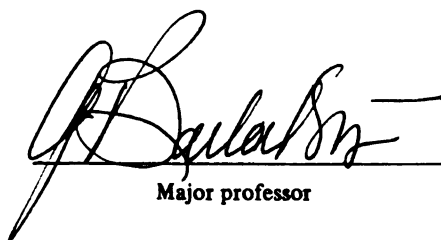
**First-Person Historical Experience:
Learning Through Multimedia Adventures**

presented by

Kevin O'Gorman

has been accepted towards fulfillment
of the requirements for

Master's degree in **Telecommunication**


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**First-Person Historical Experience:
Learning Through Multimedia Adventures**

by

Kevin O’Gorman

A THESIS

Submitted to Michigan State University in partial fulfillment
of the requirements for the degree of

MASTER OF ARTS

Department of Telecommunication

1997

ABSTRACT

First-Person Historical Experience: Learning Through Multimedia Adventures

by

Kevin O’Gorman

The Watcher is a multimedia program which is designed to aid in educating young students by not only displaying important events in history but also allowing the user to experience the events so that he or she might have a deeper understanding as to what occurred and why it unfolded as it did. It is not enough just to read accounts of what has happened. By experiencing events and conditions for themselves, students personalize the history and internalize the events. Turning anonymous historical events into actual personal events makes for a more valuable learning experience.

Based on theoretical principals of motivation, experience and problem solving, *The Watcher* is designed to capture the interest of the player, immerse that person in an encompassing narrative, and provide the conditions necessary for the player to live a desired experience, and succeed in an adventure through the use of problem solving techniques, thus ensuring a personalized learning experience that does not rely on memorization or the “pouring of knowledge” into the student’s head. *The Watcher* will be deemed at least partially successful if students wish to use it even when it is not part of a school curriculum, for its motivational and narrative components are designed to be strong enough that the entertainment value can stand alone outside an academic setting.

ACKNOWLEDGMENTS

They say that behind every great man is a great woman. If this is true, then this must be one powerful paper, because I had three great women behind me all the way. I would first like to thank Dr. Gretchen Barbatsis who has been in my corner since the day I arrived in East Lansing. Not only has she helped me to understand the theories presented here, but also to grow as a student at the graduate level by setting the bar a little higher with each assignment. As chair of my thesis committee she was a strong influence in the final construction of this paper, both in its style and the fact that it was completed.

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The third pillar of my support system, as always, has been my mother, Patricia Bessette, who made sure I had everything I needed in order to complete my degree, just as she has my whole life. It is to her that I dedicate this work.

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Chapter I: INTRODUCTION

Isaac Asimov once referred to human history as “a dark and turbulent stream of folly, illuminated now and then by flashes of genius” (1991, p.i). If people are to avoid the folly and benefit from the genius, they must know and understand what has transpired before their own personal existences. Ideally, this is what our schools are for. Unfortunately, as Elliot Soloway points out, “...the majority of today’s classrooms appear much as they did back in the 19th century...teachers still use one stone to write on another stone” (1991, p.29). *The Watcher* is a multimedia program which is designed to aid in educating young students by not only displaying important events in history but also allowing the user to experience the events so that he or she might have a deeper understanding as to what occurred and why it unfolded as it did. It is not enough to just read accounts of what has happened. By experiencing events and conditions for themselves, students personalize the history and internalize the events. Turning anonymous historical events into actual personal events makes for a more valuable learning experience.

An efficient and powerful tool is completely useless, however, if it is left gathering dust on a shelf. As the editors of *Educational Computing* put it, “Tens of millions of dollars of software sits in cabinets unused because it is of poor quality or does not fit the

instructional objectives of the teacher” (Maddux, 1997, p.70). In an effort to avoid this pitfall, *The Watcher* is designed to capture the interest, to immerse the user in a narrative that stands strong in its own right even if its educational value is not noticed or is ignored. *The Watcher* will be deemed at least partially successful if students wish to use it even when it is not part of a school curriculum. After all, today’s computer and arcade games can keep children riveted in front of a video screen for hours. What if this entertainment venue’s ability to hold an adolescent attention span was harnessed and exploited by a game that was both fun and educational? Most of today’s games are centered upon quite shallow plots, yet players do not hesitate to memorize numerous facts and personas in order to succeed in the virtual environment. Shouldn’t the formula still work, even if we replace fictitious plot elements with historical fact? *The Watcher* has been designed on this premise.

So while it is important for *The Watcher* to be entertaining enough for people to use it, it will be no different from all the other games on the market if it does not bring about an appreciable education. In order to create a strategy that will ensure an educational experience, a software designer must first understand some important concepts behind learning and education, as well as motivation and interaction.

Chapter II:

LITERATURE REVIEW

Although multimedia design is a relatively new art, studies of older media types include information that remains pertinent. It also becomes apparent that traditional and modern theories of education also share some characteristics with each other as well as with textual media. It is in the overlap of all these areas that educational multimedia finds its niche. It is on the common ground of motivation, experience, and problem solving that multimedia can bridge the gap between education and entertainment and become a powerful force in both fields.

In Experience and Education, John Dewey argues for the importance of experiential learning. Using Dewey's definition,

The subject-matter of education consists of bodies of information and of skills that have been worked out in the past; therefore, the chief business of the school is to transmit them to the new generation (1938, p.17).

According to Dewey's view of the American educational system, "Textbooks are the chief representatives of the lore and wisdom of the past... Teachers are the agents through which knowledge and skills are communicated and rules of conduct are enforced" (p.18). Learning, therefore, is the act of acquiring society's collective

knowledge, which currently resides in books and the educated elders. This collective knowledge “is thought of as essentially static. It is taught as a finished product, with little regard either to the ways in which it was originally built up or to the changes that will surely occur in the future” (p.19). In Dewey’s mind, instead of learning from texts, we should employ a much more flexible and multi-layered approach -- learning through experience.

According to Dewey, one concept that is completely inseparable from experience is environment.

An experience is always what it is because of a transaction taking place between an individual and what, at the time, constitutes his environment, whether the latter consists of persons with whom he is talking about some topic or event, the subject talked about being also a part of the situation; or the toys with which he is playing; the book he is reading (in which his environing conditions at the time may be England or ancient Greece or an imaginary region); or the materials of an experiment he is performing (p.43).

Even in 1938, Dewey left room in his definition of environment to include imaginary or artificial environments, for he believed that a created or “virtual” experience is still better than no experience at all. We know this because he states,

Observation alone is not enough. We have to understand the significance of what we see, hear and touch. This significance consists of the consequences that will result when what is seen is acted upon...We can be aware of the consequences only because of previous experiences (p.68).

In other words, students may read about events in a book, and learn *of* the actions taken by great leaders, but without experiencing the same situation for themselves, it is very difficult for them to learn *from* the actions taken by a great leader. And here is where Dewey makes his strongest argument against “book-learning” and memorization. “How many [people] acquired special skills by means of automatic drill so that their

power of judgment and capacity to act intelligently in new situations was limited?” (p.27). How many people know the right answer but only know how to respond if asked the right question?

It is here, too, that many of the current software offerings can be faulted. A majority of the software products marketed today as education or “edutainment” designs rely on memorization and the “drill and practice method.”

In the rush of enthusiasm to place computers in schools, we have witnessed the introduction of programs which make little use of the technology’s potential interactive qualities and flexibility. Programs have been developed which critics claim have emphasized an educational philosophy more in tune with Victorian schools than those of the late 20th century (Sewell, 1990, p. 13).

“In fact, much of the early software consisted of nothing more than an electronic workbook and did not take advantage of the additional capabilities that computers offer over traditional materials” (Cohen & Spenciner, 1993, p.44).

This is not to say that there is no place in the classroom for drill and practice materials, just that their use is usually implemented incorrectly. “If computer-based drill and practice programs are to be effective in the classroom, they must be consistent with and carefully integrated into the regular classroom curriculum. This seems to be an obvious suggestion, but it is violated repeatedly” (Merrill, 1996, p.71). As Merrill explains, even under the best circumstances these programs are not a very interesting learning activity for the students. At best they are only good for sessions no longer than 15 minutes per day. Merrill also states that the more successful ones, such as *Math Blaster Plus*, *Reader Rabbit*, and *States and Traits*, tend to include gaming elements that help hold the student’s attention.

Types of Educational Programs

Educational computer programs can be divided into two types: programs designed to assist teachers in teaching the same things in the same way they have always been taught and programs that introduce “a new and better way of teaching” (Maddux, p.18). The first type of programs release teachers from mundane and repetitive tasks and free more time for important, complex, creative teaching. In other words, computers allow teachers to send the students off by themselves to do drill and practice. Maddux has developed a list of characteristics of these programs:

- Require relatively passive involvement of the user
- Software developer predetermines almost everything that happens on the screen
- Type of interaction between user and machine is predetermined by the software.
User must conform to limited repertoire of acceptable answers
- Acquisition of facts by rote memory
- Everything the software is capable of doing can be observed in the first ten minutes of use, or less

As Maddux points out, a second type of program is needed to balance the drill and practice type. Unfortunately, these programs are difficult to develop and test and therefore are less common. Despite this handicap, these programs improve both teaching and learning and make things possible that could not be done without the computer. Characteristically, they:

- Stimulate relatively active intellectual involvement
- Put user in charge of what happens on the screen
- Let user control the interaction and include an extensive repertoire for input
- Aim to accomplish more creative tasks
- Take hours before user has seen all the program can do, if ever.

Under the aegis of these programs, Maddux includes Broderbund's *Where is Carmen Sandiego?* series, as well as Maxis' string of simulation games, such as *SimEarth* and *SimCity*. What differentiates the second type of games from their counterparts is problem solving. While drill and practice programs seek to develop an almost Pavlovian reflex which will guarantee a speedy and correct response each time a certain question is posed, experiential games seek to exercise and strengthen a student's problem solving skills. "In much of the recent literature, problem solving is loosely defined as those skills in critical thinking and/or logic that allow one to arrive at a previously unattained personal solution." Here a "previously unattained personal solution" is defined as "a solution different from one's earlier concocted solutions because of a difference in methods used, the circumstances, etc." (Merrill, p.88). By incorporating problem solving in a game, students are forced to develop skills that allow them to attack one issue from multiple directions. If the standard answer does not work, perhaps a modified version will.

Merrill also outlines the importance of problem solving. First, experience with problem solving increases the user's self-confidence in understanding that other similar problems can be solved. Second, problem solving helps create a sense of being self-directed in that the motivation to continue is coming from personal success, not the ability to regurgitate a preformatted answer. Third, problem solving tends to increase knowledge and experience bases. A strategy that succeeds in solving one problem can be used to solve the next. The effects of success are cumulative and this chain reaction helps the student build a repertoire of possible solutions and actions. Knowing what is possible and what works can make the next problem easier to solve. At the same time, the student is enhancing analysis and decision-making skills, which in turn increases the student's ability to deal with change.

It is not enough, though, to provide opportunities for problem solving. The correct environment must also be created. It is anti-productive and frustrating to place a student in a problem solving situation, but then hamstringing the effort through improper setting. As Merrill points out, effective problem solving requires six factors: 1) a desire to solve the problem; 2) a base of knowledge and experience; 3) a repertoire of possible actions and solutions; 4) an ability to take action; 5) resources to monitor and assess actions or solutions as they unfold; and 6) controls to effect changes as need arises.

In looking at these requirements, Merrill shows that there are four ways to provide the first, motivation. This is important, because if there is no motivation to attack the problem, then the activity is dead before it gets started and nothing will be learned. Merrill's four paths to motivation are 1) challenge, 2) fantasy, 3) curiosity and 4) control.

Dewey also comments on this need of motivation to involve students. He collects the first three of Merrill's points under an umbrella known as "purpose." Dewey refers to the formation of purpose as a rather complex intellectual operation involving observation, knowledge and judgment. The student must be able to observe surrounding conditions, to see how things interact. The student must also have a knowledge of what has happened in similar situations in the past. It is with judgment that the student then puts together what is observed with what is recalled to see what they signify (Dewey, p.68).

The Importance of Experience

A theme common to both the work of Dewey and Merrill, in addition to motivation, is the importance of experience. Experience is a well which the student draws upon in order to solve current dilemmas. As Merrill states, the effects are cumulative: If A is used to solve B, then A and B can be used to solve C, then A, B and C to solve D. Dewey shares this sentiment:

In a certain sense, every experience should do something to prepare a person for later experiences of a deeper and more expansive quality. That is the very meaning of growth, continuity and reconstruction of experience (p.47).

From this, Dewey makes two more points. First, the belief that all genuine education comes about through experience does not mean that all experiences are genuinely or equally educative. In fact, some experiences are mis-educative, such as successfully robbing a bank, or winning a lottery on your first attempt. In either situation, one may learn from the experience that these are valid ways to acquire money with minimal effort. On the other hand, it is also a mistake to suppose that acquisition of skills in reading and figuring will automatically constitute preparation for their right and effective use under conditions very unlike those in which they were acquired. Accordingly, “continuity and interaction in their active union with each other provide the measure of the educative significance and value of an experience” (Dewey, p.44).

Creating Meaning

Merrill and Dewey place experience as the cornerstone of learning. Both highlight its importance as a tool for giving the lesson to be learned personal significance. But neither really touches on how this is accomplished. In *The Act of Reading*, Wolfgang Iser looks at the relationship between readers and texts and how this relationship is the conduit for the creation of meaning and significance (1978). To Iser, a “text” is defined as a schema or “set of instructions” for establishing meaning (p.108). He recognizes that there is a relationship between the text and the reader, and that the characteristics of each must be carefully considered if communication is to be successful. His work brings forth two important concepts which, though centered on printed texts, can be applied to the realm of interactive software design to create a sturdy foundation from which the desired reader experience can develop. While both concepts, each a part of Iser’s aesthetic response

theory, investigate “meaning creation,” the first shows that meaning is generated by an asymmetrical, contingent relationship (p.164) between the text and the reader, and the second shows how the reader can be guided into creating meaning through the use of textual “gaps” (p.165).

As the reader performs the text at the author’s predesigned pace, the reader begins to anticipate the as-yet-ungiven information. The reader develops expectations, starts to synthesize meaning from the given and not-given information. By controlling the rate of information flow, and which bits of information are revealed, the text determines, for any moment in time, what portion of the “created meaning” is based on information and what portion is based on supposition. By the same token, the reader’s past experiences, perhaps including the author’s previous works, determine how the reader will interpret and interpolate the information that is revealed. Thus, the meaning of the text is contingent on the reader, but the author has an unequal, or asymmetrical, amount of control over the extent of interpretive freedom by regulating the rate and amount of information divulged.

What does this mean in terms of educational software design? Iser’s analysis of the relationship between a text and a reader can be extended to a computer game and a participant, and the relationship remains asymmetrical. That is, the software holds all the meaning potentials and to experience the storyworld of the text, the player must follow its rules. If one wishes to attract non-participants, build their confidence and hold their attention, which is a must according to Merrill, the designer must divulge the necessary environmental and narrative information quickly and completely, thus restricting the reader’s ability to stray too far from the desired meaning of the experience. At the same time, though, there must be enough flexibility for the reader to synthesize a meaning that fits within his or her experiences and is thus useful and attractive. When the correct

balance is reached, the student is able to unconsciously weave the educational experience into his or her collection of life experiences, thus keeping it on hand for future application to future experiences. This is far more preferable than trying to commit a list to memory and never realizing its use potential.

The Subject Position

The design that has been followed by the majority of software publishers up to this point is to release the information in a style that does not consider the readers and requires them to discover the correct position from which to interpret what they are given. As Iser points out, every text automatically constructs a “subject position,” (p.96) an optimal framework or point-of-view from which meaning can be created such that the experience of the reader is closest to that which the author desired. To discover the intended meaning in most games, the reader must surrender his or her current position to that required by the text. More emphasis needs to be given to the information the adventure supplies and less to the experiences the player supplies. It is the responsibility of the author to construct a text which will *bring* a reader to the desired subject position, not *inflict* one on the reader. If the program is intended for high school students, the creators should not assume the students have more knowledge than that required in a high school curriculum. After all, the goal of the program is to enhance the user’s knowledge through the use of the program, not through hours of background research needed to play the game in the first place.

If the desired position has very little in common with the player’s position, or external experiences, the construction of meaning is forced and seems artificial. This scenario will work, but it only stands to reason that the less effort required of the player, the better the odds are that he or she will remain with the interactive game and the desired experience will be found. Iser points out, if the reader fails to find the correct subject

position, at best he or she will experience only a shade of the desired meaning, at worst the student will experience “cognitive dissonance” -- utter confusion and frustration. Should this occur, the author will not only have failed in exposing the participant to a new experience, but may have turned that person away from any further attempts to achieve it.

Although the reader must participate in the assembly of meaning by realizing the structure inherent in the text, it must not be forgotten that he stands outside the text. His position must therefore be manipulated by the text if his viewpoint is to be properly guided (p.152).

Iser argues that in order to gradually “move” participants towards a new subject position, or in this case seeing history through a participant’s eyes, and avoid cognitive dissonance, the experiential text must be in a language that can be understood by the reader without too much effort. Iser suggests that the easiest and the most efficient way to make this transition is to start with the familiar, in this case genre and plot elements that are familiar to the readers and their current subject position, and then move forward to the unknown horizons of the story text (p. 96). By doing so, any initial confusion or apprehension of entering the unknown is minimized and the reader is secure before moving to the unknown. The interface must “speak to” the participants in a way that is appealing and familiar to them, in a way that lets them call upon their past experiences to help create meaning. In this way, participants build a path to their goal one segment at a time, which is similar to Merrill’s description of problem solving as an additive chain.

Aesthetics

There are many ways in which interactive software designers can attempt to “speak” to the user, including the use of color, graphics, and animation (Zettl 1990, Rieber 1990). Zettl studies four different forms of this non-verbal communication: light and color; two- and three-dimensional space; time and motion; and sound.

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In referring to the emotional impact of the proper use of the first of these elements, light, Zettl says,

Very much like music, lighting seems to be able to bypass our usual perceptual screens - our rational faculty with its critical judgment - and affect us directly and immediately (p.21).

He also states lighting can “establish a context for our experiences, a framework that tells us how we should feel about a certain event” (p.21). This comes about through the understanding and manipulation of the emotions light and color communicate. According to Zettl, light can give insight to special and tactile characteristics of objects (p.28), as well as establish mood, and foreshadow events (p.31).

As in all visual media, textual color can express emotion, mood, and characterization. The importance of quality graphics is made clear by Arnie Katz in *Inside Electronic Game Design*:

American designers put more emphasis in graphics than their counterparts in other parts of the world. It goes back to the encompassing interactive experience philosophy and the conviction that visual stimuli have tremendous powers to suck the player into the game (p.89).

Since the experience taking place involves the computer’s screen for much of its presentation, attention must be given to elements of two-dimensional space. Of great importance is paying attention to object size reference. Users will become disoriented if objects are presented in this created environment without proper reference guides, the most common being human figures (Zettl, p. 93). Without references, the scale of objects becomes open to interpretation, and as Iser noted, this can only mislead users if enough visual clues are not provided to narrow the degree of interpretation.

Also important is the use of vectors. As Zettl states, “Probably the strongest forces operating within the screen are the directional forces that lead our eyes from one point to another within, or even outside, the picture field” (p.119). Whether they are graphic (roads, buildings), index (arrows, pointers), or motion (moving people, vehicles) vectors, according to Zettl, each can be used to manipulate the viewer in what and how images are seen, and thus what meanings are created.

Of particular importance to an interactive experience is the manipulation of time. There are two types of time - objective and subjective (p.241). Objective time is a horizontal vector that measures quantity, how much time has passed. Subjective time is a vertical vector that measures relative involvement in a event, and the degree to which less attention is focused on objective time. Subjective time is influenced by event intensity, event density and experience intensity (p.254), as illustrated below in Table 2.1.

Table 2.1: Influences on Subjective Time

		High	Low
Event Intensity	energy level of events	horse race	grazing cow
Event Density	number of simultaneous events	carnival midway	stand-up comic
Experience Intensity	relevance or impact of events	2-hour exam	2-hour lecture

By making sure sequences are high energy, multi-faceted, and of relative importance, an author can help a user lose track of objective time and become unaware of the amount of time being spent on the interactive activity. Perhaps even building up a sense of anticipation between sessions.

One of the strongest assets a multimedia text has over the traditional literary text is the ability to include sound. Though speaking of television, Zettl makes a point of stressing the importance of sound,

Because all these events happen within a space, time and sound environment, we cannot simply ignore or even neglect the audio portion of such television-mediated events (p.335).

Since it is the goal of the software to provide a realistic experience, here too, sound cannot be ignored. As with light, sound has the ability to communicate both outer (environmental) and inner (emotional) conditions (p.341). While ambient sounds can give depth and location to a scene, music “is one of the most efficient aesthetic elements to create a specific mood” (p.352).

But it is not only the elements themselves that communicate meaning. Visual indicators, such as familiar icons and other graphical symbols, can act as clues to the functionality of objects in an unfamiliar setting. In a similar vein, graphical user interfaces (GUIs) using familiar metaphors have also proven to be successful in representing familiar environments and attracting new computer users to the unfamiliar world of computer processing (Piller, 1994). The trick, though, is to develop a powerful interface that speaks to the user and is at the same time invisible.

One widely held tenet says that the interface should be as transparent as possible. If the interface is intuitive and nonintrusive, designers know that players concentrate on the game-situation and forget the play-mechanics. If the interface is cumbersome, players get so involved in the operation of the game that goals become more distant (Katz, p.77).

Just as Iser moves the reader of a written text to a new subject position by linking with points of reference associated with the reader’s external reality, interactive adventures can also move a participant to a new subject position by creating an

environment where the participant's past experiences are not only valid and useful but necessary in order for the new experiences to contain meaning.

Meaning from Gaps

While the above describes *when* meaning is created, Iser's second concept describes *how* it is created. He does this through the use of information gaps. Gaps appear when two pieces of information are given by a text but they seem unrelated to each other by the reader. When a relationship is not apparent based on the information given, or the reader's previous experience, the reader attempts to create connections or bridges between the bits of information by synthesizing his or her own meaning.

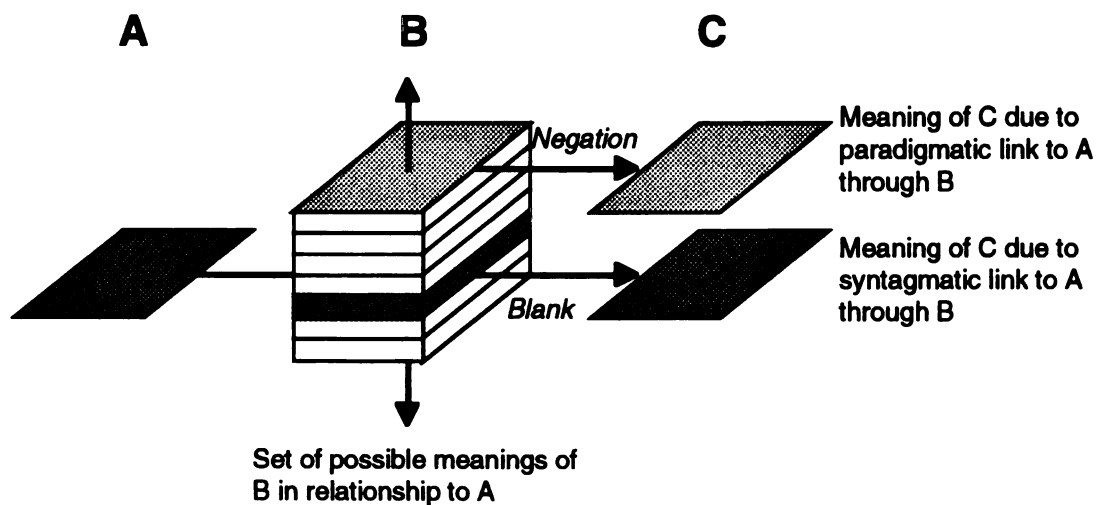
Iser focuses on this meaning creation. For him, bridging these gaps is how one produces meaning from any text (p.180). This can be extended to include educational software when the product, such as an interactive game, is viewed as a text. Iser divides these gaps into two categories: blanks and negations. As one experiences a text, the mind, whether consciously or subconsciously, tries to find patterns or connections, and is constantly trying to predict logical outcomes for the next action. When these predictions are tested and are shown to be valid later in the text, the person feels more confident, the pattern is reinforced, and the participant begins to identify more with the experience. Iser calls these reinforcing gaps "blanks" (p.182). They connect apparently unrelated concepts into a logical string.

When the prediction proves to be false, or the synthesized meaning does not seem to fit, the participant can feel confused and disoriented, unsure of what is being experienced. The mind immediately begins reformulating the connections and the meanings, based on any new information. These gaps are called "negations," for they call for a rethinking of

the experience (p.212). At this point, the viewer must restructure the connections, maybe with a more figurative approach.

In studying written works, Iser speaks of the syntagmatic and paradigmatic levels of a text (p.216). On the syntagmatic level, bits of information and meaning are connected in a linear fashion according to structural rules, much like grammar. In a paradigmatic sense, the same piece of information can have multiple meanings, or multiple possible meanings. To ensure that the participant's experiences are the ones the author desires, it is up to the author to leave just enough clues to guide the experience -- nudge the reader off the wrong path and attract the reader down the intended one. This perspective is shown in Figure 2.1, below. First, if the participant's interpretation of B is correct, he or she builds a syntagmatic link to C. If a different facet of B was intended, the reader may end up on a misdirected or meaningless path. The reader of the text must then back up and alter the paradigm being used to create meaning. The result is a different, yet equally valid meaning for C, which nonetheless maintains the logical flow of the text.

Figure 2.1: A Paradigmatic Shift in a Text



Using gaps as tools, a text creator, such as the editor of a history textbook, can guide a participant along a syntagmatic line using connective blanks. As a participant follows the events unfurling in a history book, that participant inserts created meaning to bridge what is unstated, resulting in a logical and meaningful flow, at least to the student. For example, a student reading about the events that led up to the atomic bombing of Hiroshima and Nagasaki might link the fact that the Allies were winning the war, Japan was slowly collapsing, and the war in Europe was over to mean that Truman unnecessarily used the bombs and was a cold, heartless person. However, if a student had a chance to experience what Truman experienced -- the political pressures to end the war, the need to intimidate the Soviet Union, the military projections of the number of U.S. casualties that would result from an invasion of the home islands -- the same student might conclude that Truman's actions were unavoidable. In other words, a paradigmatic shift in how events are viewed is possible because of the way information was syntagmatically linked. The act of experiencing the events and becoming personally involved with them supplied enough additional information to create a radically different meaning from the same information that was available in the textbook.

It is possible that an inexperienced participant may be faced with many more negations than blanks during the first few forays into a game. The player's attention can be so focused on the battle mechanics (tactics, supplies, transportation) of a war game that the nuances of the underlying events, people involved, and pivotal decisions can be lost or never even recognized. However, by experiencing a number of reinforcing blanks early on (hints from assistants, menial tasks handled by the computer, successful application of the student's previous experience), it is possible that the participant will see a negation as an obstacle to be overcome rather than a barrier to be surrendered to. For it is in overcoming the negations that learning takes place. Thus, in designing the

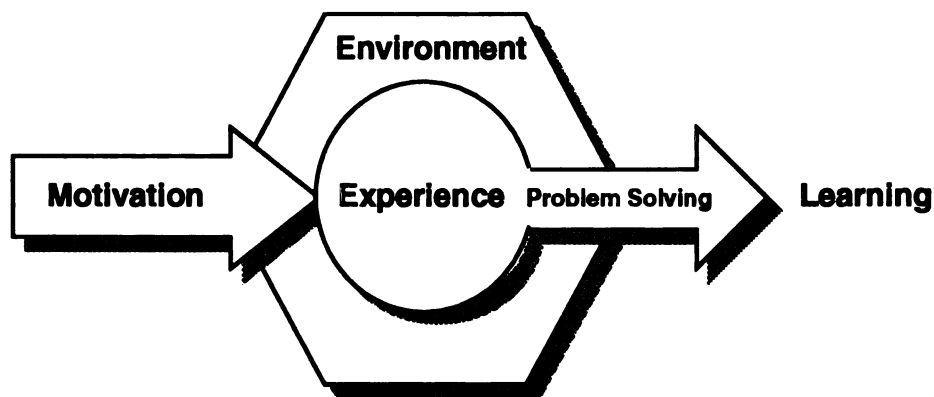
interactive experience, particular attention must be paid to including familiar texts at the beginning of the session. The participant's cognitive effort should be focused on linking known concepts, not interpreting unknown ones. "The primary characteristic of educational game software is to allow a player or student to interact with instructional materials in a motivationally stimulating game format" (Merrill, p.87).

While Iser's work shows how meaning can be created by experiencing a text, it is the work of Merrill and Dewey that explains the need for experience in an educational setting and the need for motivation in order for students to complete the experience. When combined with Maddux's requirements for a quality problem solving experience and Zettl's methods of aesthetic communication, a motivationally-driven problem-solving learning experience can be created by a multimedia author. It is within this framework that *The Watcher* was developed.

Chapter III: METHOD

By combining the contributions of Dewey, Maddux, Merrill, Zettl, and Iser, an author can create an engaging and motivating educational experience. In order to focus all efforts on this goal, a model, Figure 3.1, was developed as a guide for the development of the program.

Figure 3.1: Framework Model



As the model demonstrates, motivation leads the student to an experience in a given environment. If part of the experience includes problem solving, then it will lead to learning. To be considered for inclusion in the game, elements had to show an ability to enhance one of the three keys (motivation, experience, problem solving) of the model.

Next, each key was broken down into aspects. Each of the aspects was divided into design principles. The principles were then grouped with their respective design components. This resulted in tables that break down motivation, experience and problem solving.

Table 3.1: Design Key – Motivation

Aspect	Design Principle	Design Component
Challenge	Obstacles	• Confusion • Unreliable equipment
	Surprises	• Unexpected detours • Unexpected opportunities
Fantasy	Identify with character	• No predefined appearance • Player can define attitudes
	Invisible interface	• No artificial controls • Mouse acts as virtual hand
	Immersive environment	• Full-view scenes • Useable objects • Talk to other people
Curiosity	Novelty	• Compelling story • Outside of the ordinary
	Unknowns	• Unexpected turns • Incomplete story
Control	In charge of events	• Issue orders • Choose paths/actions • Not questioned/authority

The major aspects of motivation, as expressed by Merrill and shown in Table 3.1 above, are challenge, fantasy, curiosity, and control. In order to incorporate them into the game design, these aspects had to be broken down into more distinct design principles and then concrete design components.

Components of Motivation

At its basic level, **challenge** is the way a game taunts and teases, daring a player to continue. Elements such as uncertain outcomes and multiple levels of goals keep success within reach, but just out of grasp. These ideas can be expressed by the principles of obstacles and surprises. The components of obstacles include confusion and unreliability. These serve to keep the player from achieving the established goals too early or too easily. Some examples of surprises would be unexpected detours and unexpected opportunities. These random events can hinder or aid the quest for success and may or may not be repeatable events if the same game is played a number of times.

Fantasy “addresses the emotional needs of students and encourages identification with imagined characters or context” (Merrill, p.100). In order to construct such an environment, the author would need to incorporate principles such as character identification, invisible interface, and immersive environment. Of utmost importance to a first-person perspective game is the ability to make a player feel as if he or she is the character, to get so caught up in the story that they surrender to the subject position completely. This requires components such as undetermined appearance and undefined attitudes.

By avoiding the opportunities for reflections, the player never has an image of the character imposed upon the experience. This allows the player to fill in that information with his or her own personal appearance. By allowing the player to determine the attitudes of the character, the player is not forced to work at staying “within character” and can concentrate on the tasks at hand.

An invisible interface seeks to avoid the artificiality of interacting with an environment through a keyboard or god-like control panel. The interaction between player and environment should be as natural as possible, so as not to disturb the fantasy.

For this reason, invisible interface can be built into the design components of no artificial controls and treating the mouse cursor as a virtual hand.

Reinforcing the aspect of fantasy can also be brought about through the principle of immersive environment. This principle consists of full-view scenes, useable objects and communicable characters. Full-view scenes consist of images that take up all of the space on the computer screen. Some computer games use multiple windows to allow players to see their immediate environment, an overhead view of where they have traveled, and various status bars all on the screen simultaneously, and all quite unnaturally. To maintain the illusion and immersion, the player should only be allowed to see what one set of eyes can see at any given time.

Along the same line, actions should not be chosen from a pull-down menu or from icons on a control bar. If the player needs to look at a note, then the player should pick up the note. If the player needs to open a door, then he should reach for the door knob. The more natural and intuitive the better. For as Iser points out, any effort spent trying to figure out how to complete an action is taken away from experiencing the action. Therefore, useable objects are very key components for maintaining an immersive environment.

Finally, there is the need for communicable characters. The best situation would be a voice-responsive interface that can listen to the player talk and give appropriate responses verbally. This, however, is limited by the available technology. To make the program available to the most people in an educational setting, it is more realistic to utilize text-based communication. But this does not free the author from creating interesting and germane dialogue that progresses the plot and flows naturally enough to maintain the fantasy environment.

Curiosity can be seen as the amount of favorable interest in the differences between the player's past experiences and the situations being presented in the text. Merrill states that sometimes a moderate level of content complexity or a discrepancy from the player's current state of knowledge is all that is required to get a student to latch on to a given scenario. "The story can be somewhat novel, but not totally foreign" (Merrill, p.100). If it is too different from the student's prior experiences then he or she will have nothing to work from. This is what Iser refers to as cognitive dissonance. If it is too similar, the student will soon lose interest. Like any good detective novel, elements that stir the curiosity can go a long way in attracting the user to continue past a momentary roadblock. These elements can be grouped as novelties and unknowns.

The novelty of a situation refers to its newness. This can be as basic as having an original story or as advanced as taking a well-known story concept and using it in a new and unexpected way. Novelty can also be achieved by taking a familiar object, such as the player, and dropping that person in an unfamiliar situation. Dealing with the unfamiliar or the unknown is the second design principle for invoking curiosity. Unknowns consist of the unexpected turns a story takes, situations that leave the player with no possible idea of what lies beyond the next unavoidable step, and the holes that exist in the currently incomplete story. The unknowns are what Iser refers to as gaps. It is the need to fill these gaps that can drive players to continue a game, or to start one in the first place.

The final aspect of motivation is **control**. "One of the most frequently cited requirements for an effective game is a powerful sense of control" (Merrill, p.100). To achieve this feeling, the outcome of the game must be dependent on the student. This eliminates the electronic books in which the student merely clicks the mouse for the

pages to turn. In those cases, the story will resolve itself the same way, each time, no matter how the student clicks for the pages to turn. A sense of control is also strengthened if events rely on strategy and skill instead of randomness.

The easiest and most direct way to confer a feeling of control is to place the player in a position of authority. Give the player some subordinates, whether they are servants in a fantasy role-playing situation, or administrators in an urban simulation. In this way, the player benefits from the advice of “experts” while remaining free to make the final decision.

Components of Experience

The next design key is the experience. In applying Iser’s point, immense care must be taken in preparing the player for the optimal subject position from which to experience the text and create the intended meaning. Table 3.2, below, shows how experience can be broken down into two aspects: the transaction between the reader and the text, and the significance of the experience.

Table 3.2: Design Key – Experience

Aspect	Design Principle	Design Component
Transaction between individual (reader) & environment (text)	Subject position	• Theme and horizon • Familiar vs. new
	Asymmetrical, contingent relationship	• Extent of previous experience • Rate of revealing new information
	Cumulative effect	• Current experiences prepare the user for experiences to come
Significance	Meaning creation	• Blanks • Negations

As shown in the table, the **reader-text relationship** can be described by three design principles. The first principle is subject position and Iser associates it with the component of theme and horizon. Simply put, instead of flinging the player unprepared into a new environment, the designer needs to set up checkpoints and guide the player to the new way of thinking in stages. Each stage is unified by a theme close to the player's current position and looks out towards the new material on the horizon. As the player becomes familiarized with the material on the horizon it becomes the current position as new material crops up on the new horizon. For design purposes, the author must designate what skills and knowledge are necessary at particular stages of the game and make sure that events allow the player to develop or obtain them before they are needed. To ensure success, the designer must make sure that the amount of change between each stage is not too great, causing confusion, and not too small, causing boredom. In effect, the designer must strike a balance between the familiar and the new. Surrounded by a familiar environment, the player will feel comfortable. Under these conditions new elements can be introduced. As these new elements become familiar, then additional elements can be added. Before long, and without much distress, the player has greatly increased his or her collection of experiences to the point that the desired subject position is now familiar.

Having attained the proper subject position, the player is now ready to reap the benefits of the reader-text relationship. The second part of this relationship concerns the asymmetrical and contingent aspects. With the help of motivating factors, the player has now abandoned the previous extent of his or her experiences and allowed the game to present and incorporate additional ones. Some may reinforce previously held beliefs, and some may shatter them. This is the asymmetrical part of the relationship. The game has the final say on what is necessary for achieving the most efficient subject position. For this reason, the designer must take the utmost care in deciding what is to be included.

Some concepts, such as ruthlessness or deceit, may be important in the game environment, but may not be desirable in the real world. The designer should always keep in mind what is being “learned.”

This is not to imply, however, that whatever is presented through a multimedia program is an omnipotent force. Regardless of how efficiently and powerfully the experiences are designed and presented, everything is received by the player after being processed through a series of filters created by the player’s previous experiences. It is in combination with these experiences that the new information develops meaning. The end product is always contingent on the player. Without the player experiencing the text, there is no meaning creation. Because of this, the designer must always be aware of the intended audience and mold the text so as to affect the audience’s previous experiences in the desired way. Part of this process is leading them to a common subject position. Clearly the two concepts work hand-in-hand.

The third principle in the reader-text relationship is illustrated in Merrill’s argument for the importance of problem solving. He states that the effects of successful problem solving are cumulative and that the chain reaction helps students to build a repertoire of possible solutions and actions. If knowing how to use an object is important for completing the game, the player should be given ample time to experiment with the object in order to learn its full range of usefulness and become familiar with it. This is the basis for Iser’s theme-and-horizon method of modifying the player’s subject position. It is a building process and cannot be thrown at the player. Iser presents the key to this building process in the next aspect of experience design, significance.

An event or object needs **significance** in order for it to be incorporated into someone’s experiences. By definition, something that has significance is meaningful,

and Iser has two tools for meaning creation that must be included in a design in order for the text-supplied experiences to be worth incorporating into the player's experiences. These tools are blanks and negations.

Blanks occur when a player anticipates the outcome of an unknown situation correctly. If the story's progression continues to make sense, then the player is successfully creating meaningful blanks. Negations occur when a player incorrectly anticipates the next step. This can be as simple as hitting a dead-end at the end of a hall, or as complex and misunderstanding the motivations of another character. In either case, the player must stop, backtrack a little, reassess the situation and create a new meaningful path. The train of thought has been negated and needs to shift to a new paradigm.

A player needs to face blanks so as to develop a sense of order in the experience and a self-confidence in the ability to predict outcomes. As Iser points out, it is through blanks that a reader begins to feel familiar with the experience. Negations are needed to alter the player's assumptions and steer the person towards the better subject position. Working out a negation, in effect, is the process of learning something new. By placing a chain of blanks before the player at the start of the game, the player can develop a sense of ease in the new environment and begin to build patterns of logic that work within the virtual world. Once the player is treating the virtual world as familiar, then negations can be introduced in order to shape the experience as desired by the game designer. Too many incomprehensible events, or impossible tasks early in the game will only serve to frustrate the player and destroy the motivation to complete the experience.

Components of Problem Solving

Table 3.3, below, divides the concept of problem solving into four parts. This condensed version of the list introduced by Maddux includes intellectual involvement, user importance, task creativity, and program variability.

Table 3.3: Design Key – Problem Solving

Aspect	Design Principle	Design Component
Intellectual Involvement	Challenge	• Rise above confusing situations
	Surprise	• Unexpected events
	Obstacles	• Dead-ends • Pitfalls
	Role-play	• Personality building • Emotional links
User Importance	Events result from user action	• Choose paths • Choose responses
	Computer waits for user	• Scenes wait for input • No time limit • No interruptions • No prolonged loss of control
Task Creativity	Not just one answer	• Fight battle as you wish • Correct decisions rewarded • Incorrect decisions explained
	Free to experiment, observe, formulate, initiate	• Ability to change decision paths before committing to action • Visual feedback
Program Variability	Different forms of interaction	• Narrative • Conversation • Physical

The first aspect is **intellectual involvement**. To achieve this, a program design needs to contain elements of challenge, surprise, obstacles, and role-play. As explained earlier for motivation, challenge, surprise and obstacles force a player to rise above confusing situations, to work on a level beyond reflex or habit. Just as they are needed to motivate

a player to experience a game, these same elements serve to tempt or goad a student into solving a complex problem instead of giving up.

The principle of role-play needs to be included so as to involve the player in the narrative. Two ways to achieve this are personality building and emotional links. By providing the instruments by which a player can shape the character's personality, the designer allows the player to invest part of him- or herself in the character, thus personalizing it. With such an investment in place, the player is more likely to protect the character from harm and put more effort into solving dilemmas that threaten the character. Also, as the text is experienced, the player builds ties to other characters within the storyworld. These emotional links to narrative elements can also serve as impetus to solve a problem rather than turning off the machine or starting over.

The next aspect is **user importance**. This is not intended to be a passive medium. The player needs to experience the text, and therefore should direct events, not watch them flow by. Events and consequences should be a direct result of the player's interaction and be based on logical sequences. The player must feel that taking action has an effect and that decisions are worth making. Whether it is choosing a path to take or a response to make, these actions need to have a perceived value.

Additionally, since this is a learning environment, and different people learn in different ways and at different speeds, the computer needs to wait for player action. Circumstances should not be allowed to sneak-up on or overwhelm the player while options are being pondered or discussed. Scenes should wait for user input before changing or proceeding. There should not be a time limit for making choices, or lots of interruptions at major decision points. While short automated segments that move the plot along, can be useful and informative, there should not be prolonged segments where

the player has no control over the character. The ability to make decisions should not be taken away or it shatters the illusion of self-control and player importance.

The third aspect to be included is **task creativity**. Not only should the player's intellect be stimulated, but the imagination as well. Creativity should always be encouraged for problem solving. Therefore, the design should allow for more than one right answer. Allowances should be made for students who wish to pursue their own agendas and see how their solutions differ from previous attempts. While correct decisions are naturally rewarded with success, incorrect decisions should not carry a penalty, but rather should result in explanations as to why the choices are not the wisest. Students should feel free to experiment, observe, formulate and initiate. The design should allow a player to try a solution, and if it does not seem to be working, or new information casts doubt on its success, the player should be able to acknowledge the negation and choose a new solution. This negation can be supplied in the form of character dialogue, visual feedback, or audio feedback, or a completely unexpected result. What is important is that the student be able to observe the progression of the solution and formulate and initiate supplementary actions as needed.

Program variability refers to the ability of the software to show new or varied abilities over time. Whereas most drill and practice programs can become predictable after the first ten minutes of use (Maddux, p.21), problem solving programs cannot afford to be so redundant. As the player travels through the experience, new activities must be encountered. If the player begins to recognize a pattern of activity, the experience can become predictable, thus diminishing its value. To maintain enthusiasm and engagement in the experience, it must remain fresh. The player must be able to develop a sense of success and moving forward, not a sense of being trapped in an endless loop. This variability can be achieved by changing the mode of interaction. While a narrative form

can be useful early on to help position the player in the experience, conversation and physical interaction are more realistic and can add more flavor to the experience.

By skillfully applying the design components identified for motivation, experience, and problem solving, a designer can create a multimedia text that has the capacity to teach its players as well as entertain them. In playing the game, students are exposed to an environment that has the characteristics to attract and keep their attention, allows them to create personally significant meaning for the experience, and forces them to think creatively in solving problems that are personally important to them.

Chapter IV:

RESULTS

Having established the necessary criteria for creating an engaging leaning experience, the principles were applied to the creation of *The Watcher*. This first-person perspective adventure in history is aimed at middle and high school students and can be incorporated into classroom use or purchased by a consumer for use at home. This introductory adventure of *The Watcher* is intended to be the first in a series of ongoing adventures which would allow students to experience different moments in history in a familiar format. In this particular episode, the player assumes the persona of a graduate student who is part of a program that travels through time to study historic events. The player soon finds this is not as easy as it sounds and does more than observe Napoleon's victory at Austerlitz.

The Watcher was created with mFactory's mTropolis v1.1 authoring software on a Macintosh PowerPC. The graphic elements were created or enhanced using Adobe's Photoshop v4.0 and the sounds were digitized and edited using Macromedia's SoundEdit 16 v2.0. By using mTropolis, the modular design of the game allows for the easy addition of later adventures, which lengthens the usefulness of the software. Additionally, mTropolis projects can be configured for both PC and Macintosh computers, thus making them universally available to students and school systems.

To ensure a consistent look throughout the program, all graphic elements were hand drawn by one person. The line drawings were digitized with a flatbed scanner, then colored and enhanced in Photoshop. As dictated by the requirements of mTropolis, all images were saved as PICT files and limited to a color palette of 256 colors. To make it easy to transport the program from Macintoshes to PCs, one common palette (the Macintosh system palette) was used.

For design purposes, the scenery was divided into three categories: 1) the Land Rush, 2) the Drop Room, and 3) Austerlitz. The Land Rush images were colored with browns and yellows in order to be energetic and to communicate the vast openness, and dustiness, of the plains. The Drop Room pictures utilized many blues and grays which were broken up by highly saturated accent colors. The intention here was to communicate the sterile, electronic, high-tech environment of the lab. Scenes from Austerlitz used muted, fuzzy imaging which included a lot of fog and gray. Military camps are not meant to be cheerful, and the drab environment is counterpointed by the golds and yellows shown inside the warm, enclosed strategy tent. The battle map itself utilizes a few simple greens and browns, while the troop pieces are colored in accurate uniform colors of blue for the French and green for the Russians. While many history books will not bother to mention the color of the soldiers' uniforms, users of this software will walk away with the images in their heads.

Digital sound files were created from a variety of sources, including both original recordings and existing files. All sound files were originally saved in the AIFF format, but were changed to QuickTime movies because mTropolis afforded better control for that file type.

Period music proved to be the most difficult to obtain. Because any nondiagetic sound would work against the effort aimed at creating an illusion of realism, these elements had to carry great significance. Unfortunately, because the Napoleonic Era developed out of the ashes of the French Revolution, there were not many skilled composers left in French territory. While British, Russian and German composers continued to create, all of France's efforts were focused on survival. Therefore, despite being written more than a decade after the Battle of Austerlitz, Tschaikovsky's "1812 Overture" is used to enhance the emotion of some scenes. Although written by a Russian at the request of the Tsar, and celebrating the Russian victory over Napoleon during the invasion of Russia, the piece does include French and Russian themes. Pieces of the "Marseillaise," anthem of the French Revolution, and Slavic folk songs are incorporated into the orchestration and make it a worthwhile representation of the people at the time. And in the end, that is the goal of this software.

As Maddux points out, computer simulations make possible experiences that are too expensive, too dangerous, or otherwise unavailable to most people (p.29). To take full advantage of this potential, a time-travel adventure was chosen as the subject matter for this study. *The Watcher* is set in the near future. The student assumes the persona of a graduate student in a chrono-anthropology program. Science has developed a means for sending people back to a specific time at a specific place, allowing them to observe historic events and then return to the present to publish their findings. While using the program, the participant soon realizes that things do not always run as smoothly as planned. First the student is whisked off to the wrong era, and then when the student does arrive at the proper time-place, the Battle of Austerlitz, events force the student to abandon the position of observer and to take command of the battle in the place of an injured Napoleon.

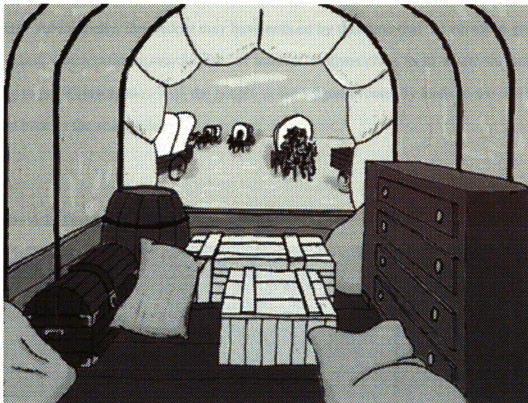
Narrative Overview

The structure of the adventure text has been set up according to Iser's recommendations. In order to facilitate a transition from the user's current position as a middle or high school student to that of a 19th century military commander, a number of phases have been created. The first phase tries to be most familiar to the new user. As the adventure begins, the main character is a student embarking on his or her first trip into time. For a more complete outline of the story, refer to Appendix A, Narrative Diagram of *The Watcher*. By using a character that is also embarking on a first-time adventure, it is quite natural for the user to have questions about what is to happen, be unsure of what the next step will be, and yet have a specific knowledge of the events to be studied. Just like the character, the student will have to learn the details through experience.

To grab the student's attention right away, the introductory text is suddenly interrupted by the first problem: The student has been sent to the wrong era. At this point the student has done nothing but start up the program and read two screens of lead-in text. Instead of appearing in Austria as planned, the character finds him- or herself (the gender of the character is left ambiguous on purpose in order to appeal to all students) in the back of what appears to be a covered wagon, as shown in Figure 4.1, below.

It is here that the student is given the first chance to interact with this new world. Nothing is time critical and the student can take a moment to get a feel for the interface and explore the environment. With a little experimenting, the student soon finds that the dialogue box at the bottom of the screen can be made to appear and disappear by moving the mouse towards and away from the bottom of the screen. Also, available action options will highlight as the cursor passes over them.

Figure 4.1: Inside the Wagon Facing Back

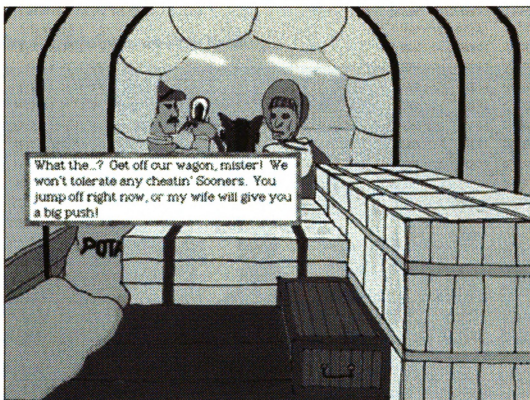


The environment itself is a colorful hand-drawn scene inside the back of a covered wagon. The thunder of hooves and rattle of the wagon can be heard and the view out the back of the wagon bounces around with the motion of the wagon. Additionally, western theme music welcomes the student to the scene and aids in orienting the misplaced time-traveler.

The student then turns to face the front of the wagon and meets other characters for the first time. A man and a woman are up front driving the wagon and the student has the option to speak to them or to try to return home (see Figure 4.2, below). If communication is attempted, the student finds that character dialogue boxes appear on screen near the speaker and disappear when the student's options appear. The dialogue can however be toggled back, in case the student needs to read it again. The cursor

changes into a small talking bubble (as seen in comic strips) when near a character who can speak. The student merely clicks in the spot to bring back what the character is saying. Additionally, the student may have noticed by this time that the cursor in general is a hand, which points towards areas of interest or gives clues as to where the student needs to go. Conversation with the people in the wagon eventually leads to the option of going back to the science lab.

Figure 4.2: Inside the Wagon Facing Front

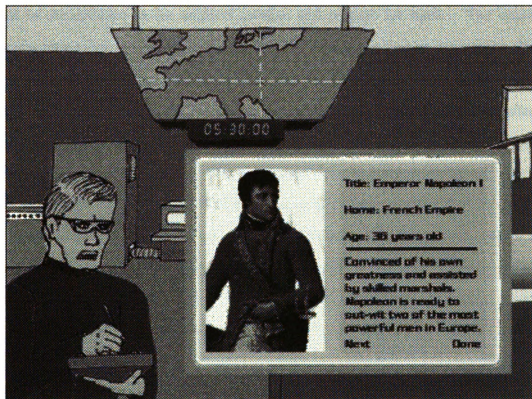


If the student opts for trying to go home, the character's arm scrolls in from the right side of the screen holding a gold pocket watch. At this point the student has not been told about the watch, but the cursor changes to an open, grabbing hand when over the watch.

If the student clicks on the watch a spectral vortex and accompanying sound effects zip the character back to the science lab where the time-travel equipment is kept.

Depending of the actions taken in the wagon, the student at this point either has some experience in conversing with other characters or not. Regardless, the student now has the opportunity to converse with the scientist in charge of “dropping” people in time. It is through this conversation that more background story is revealed to the student. But enough blanks are left for the student to make the character unique and personal.

Figure 4.3: Briefing in the Drop Room

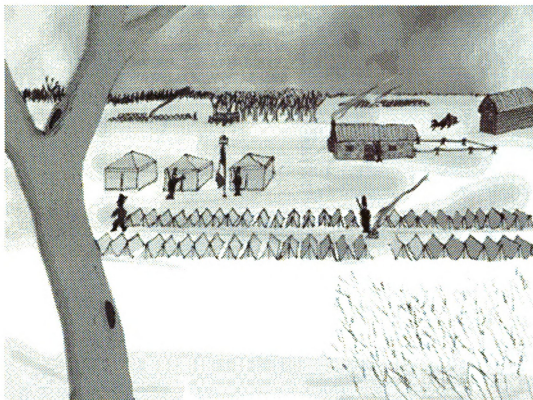


Before attempting to travel back in time again, the student is given a chance to review some of the historical material regarding the target area, as seen in Figure 4.3, above. A

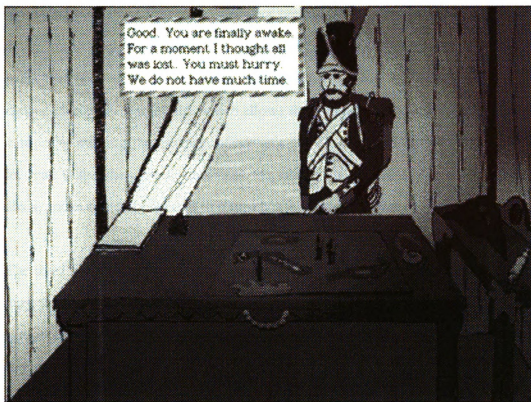
map of the battlefield, biographies of the leaders, and a synopsis of what is about to occur are made available. Additionally, the student's "cover story" is reviewed and the function of the gold watch is made clearer. By the time the student does travel back to the period which is to be studied, he or she is a veteran time-traveler, well-versed in interacting with the environment and other characters, and loaded with the information necessary to succeed in the tasks ahead. The student is now ready to move into the second phase.

A successful "time drop" places the character on the outskirts of the French encampment shown in Figure 4.4, below. It is early December and muted colors in the low-contrast scene serve to bring the season's chill to the student. Camp sounds can be heard in the distance as the soldiers awaken and prepare for battle. The character ventures into camp and encounters a guard. The man is bundled up against the chill of the night and a small fire crackles beside him. What proceeds as small talk, actually brings out a major factor to the French success, as the sentry wonders about the effect of the morning fog on the battle.

Figure 4.4: View from Outside Camp



It is while the character heads to the strategy tent, where the historical observations are to take place, that the time-altering accident occurs. Walking in the fog, the character mistakenly steps in front of a speeding ammunition supply wagon. The wagon veers away and crashes into a small wooden structure. In the ensuing gunpowder explosion the character is knocked unconscious and everything fades to black. The character awakens inside the strategy tent with a sergeant guarding the entrance, as seen in Figure 4.5, below.

Figure 4.5: Inside the Strategy Tent

Sgt. LeClerq wastes no time in explaining to the student what has occurred and what needs to be done. Napoleon was inside the building that the cart crashed into and was severely injured in the explosion. The doctor is sure he will recover in time, unfortunately the allied Russian and Austrian troops have begun their advance and there is no time to recall one of the marshals to take command. As ranking officer in the camp (the student is disguised as a captain in the supply corps), it is up to the student to take command of the situation. Being placed in such a position will challenge the student to succeed and play on a sense of honor or responsibility, thus developing motivations for the student to complete the program.

At this point the student can agree to help or attempt to return home. Attempts to return home via the gold watch, however, are doomed to failure. Since the chain of

events have now changed so drastically, the future which created the technology of time-travel no longer exists and the watch does not function. The student will find that there is no choice but to play out the battle. After agreeing to help, the character is introduced to the tools that will be available. From the scene in the tent, the student can access an interactive map of the battlefield, which allows the character to issue movement orders to the troops by moving the corresponding unit on the map and see the progress of the battle, read dispatches from spies near the enemy camp and status reports from the marshals, and continually attempt to return home via the gold watch.

The third phase of the program requires the student to coordinate the battle from the strategy tent. By clicking on the map on the table the student is presented with a topographical map of the surrounding area on which have been placed infantry and cavalry pieces, representing the units of both armies, see Figure 4.6, below. During the battle, the student is free to move the French units around the map. Based on these actions, LeClerq relays orders to the marshals out in the field, who are under the belief that the orders are coming from Napoleon. The distance that the pieces can be moved is limited by how far the actual units can move in a given amount of time. After moving the desired pieces, the student clicks on the issue orders button, which records the moves that were made and updates the allied army's positions. Move by move, the student can react to the Russo-Austrian attack and attempt to save the day.

Figure 4.6: View of the Battle Map

During the course of the battle, sealed envelopes will be passed across the map table to the student. By clicking on an envelope, the student is able to read the intelligence or status updates from the battlefield. Some are reports from spies, while others are requests and warnings from the marshals.

When one side is eliminated from the battlefield the conflict ceases. If the allies win, the student will find that he or she is now a prisoner of war, that the watch will never function and that history has been rewritten. However, the more likely result is that the French will be the victors. In this case, victory bells toll, music plays, and one last dispatch arrives. It is from Napoleon himself. Much to the student's surprise, the emperor had recovered enough from his injuries to ride out to the battlefield. He is very pleased with the results he has seen and cannot wait to get back and meet his new general. Since the character's involvement in history up to this point has been bad enough, the

student is encouraged to try the gold watch again, which will work this time, and leave before anyone can ask any troublesome questions. For a more complete overview of the program's structure, see Appendix B.

Applying Methods

The Watcher is a multimedia program designed to aid in educating young people by allowing them to experience events and allow them to construct personal meanings for the events that occurred in early December, 1805, on a hilly plain west of Austerlitz, in what is now the Czech Republic. The design is founded on three design keys: motivation, experience, and problem solving. In Chapter III, these keys were broken down into aspects, and then further into design principles and design components. The abstract design components formed a framework for the design of *The Watcher* as they became concrete elements which were incorporated into the narrative. This can be illustrated by adding a fourth column to the tables seen in Chapter III, which lists examples of the design components as they appeared in the game.

For example, the challenge aspect of motivation requires some sort of obstacles. Among those obstacles could be elements of confusion or inconsistency. To create confusion, a player could be forced into a situation without any guidance. In narrative terms, this resulted in the character materializing in the back of a covered wagon not knowing what to do. Another type of obstacle was the fact that the gold pocket watch, which serves as the return mechanism for time droppers, cannot always be counted on to function properly (especially once the character has altered history too much). The first table, Table 4.1 shown below, illustrates how motivational components were incorporated into the game structure.

Table 4.1: Design Key – Motivation Extended

Aspect	Design Principle	Design Component	Example
Challenge	Obstacles	• Confusion • Inconsistency	• Dropped right into story • Watch doesn't always work
	Surprises	• Unexpected detours • Unexpected opportunities	• Sent to Oklahoma first • Chance to command army
Fantasy	Identify with character	• No predefined appearance • Player can define attitudes	• Disguised character could be of either sex • Player responses can be forceful or cautious
	Invisible interface	• No artificial controls • Mouse acts as virtual hand	• Sight, sound, touch • Use mouse directly on objects and people
	Immersive environment	• Full-view scenes • Useable objects • Talk to other people	• Character's view fills screen • Grab/use objects in view • Click on people to converse
Curiosity	Novelty	• Compelling story • Outside of the ordinary	• Lost in time/imminent battle • Player's confusion is parallel to character's, becomes part of the story
	Unknowns	• Unexpected turns • Incomplete story	• Once story is derailed, not sure what can happen next • Don't start knowing everything, and what you do know does not prepare you
Control	In charge of events	• Issue orders • Choose paths/actions • Not questioned/authority	• Control army in battle • Choices in actions • Military setting

To create surprise, it was determined that a design needs to incorporate unexpected detours as well as unexpected opportunities. The clearest example of an unexpected detour in the story is at the beginning when the player is dropped into the Oklahoma Land Rush instead of Austerlitz. At the other extreme, an unexpected surprise for someone sent to watch a pivotal battle is to find oneself leading the army.

Elements of Fantasy

In order to motivate the player through elements of fantasy, it was determined that the player must be able to identify with the character being played. To this end, the character must not have an extensively predefined appearance. Based on this, the appearance of the main character is never clearly defined. The player is told through the narrative that the character is dressed in period costume, specifically that of a captain in the Train des Equipages, but all that is ever seen of the character is an arm and gloved hand. Because of the pretense of a disguise, the player is free to identify with the character regardless of age, sex or race. It can be assumed that all necessary precautions would have been taken by these scientists to make sure that the time-travelers do not look out of place, including language lessons.

Equally important is the ability of the player to define the character's attitudes. Just as an actor injects personal attributes into a role, a player must be able to add a piece of himself or herself to the character. To force a persona upon the player can only hinder the ability to identify with the character. To avoid this, different options were made available for the player to choose from when conversing with other characters. Of the two responses, one may be forceful while the other is cautious, one might be impetuous while the other is conservative. For example, when the character awakens from the wagon accident and is updated by the sergeant, the player has the option of being bold and acting like he or she knows what is going on and agreeing with the sergeant, or can respond more cautiously and ask what is going on. The player is free to choose the response that seems more comfortable or natural.

To maintain the "realness" of the adventure the player cannot be encumbered with invasive interfaces. The goal is to focus attention on the tasks, not the tools. To meet this

demand the player interfaces with the environment using a first-person perspective that relies on the five senses. The player sees through the character's eyes and nothing more. There are no auxiliary map screens or radars or overhead views. When the player needs to see an all-inclusive view of the battle, it is not through an omniscient vantage point in the sky, but a view of a map table with painted lead figures being moved about, just like the tacticians of the day would see it. The army units are not moved by using "arrow keys" or control panels, but by picking them up and placing them where the player wants them to go. In this sense, the mouse acts as a virtual hand. Throughout the experience the player is able to use this "hand" to pick or use objects that exist in the text. This direct manipulation reinforces the feeling of being there and is much closer to how people actually interact with their environment than some of the other metaphors used.

Additionally, the illusion of being there can be reinforced through the use of immersive environments. As seen in Table 4.1, components of an immersive environment include full-view scenes, useable objects, and the ability to talk to other people. In *The Watcher*, the monitor is filled with what the character sees. Each scene is one person's point-of-view. The only departure from this is the inclusion of the dialogue windows.

While it is technologically possible to have created digitized audio files of the responses, there were many reasons for making a design decision against including them. First, written versions of the responses would have to be shown to the player so that one could be chosen before it was played. Since the player would have just read the responses, it was judged redundant to then have it played out loud for the player's benefit. Second, this program is meant to be used in a school setting. While headphones may make it possible for one person to play the game without disturbing others, it would preclude two or three students from experiencing it together, a situation that is all to

common in schools with limited resources. Intermittent sound effects were judged less intrusive in a group environment and turning them low so as not to disturb others, while lessening the impact they add to the experience, does not leave gaping holes in the narrative. There is also a production-quality basis for deciding against using voice files. It would have necessitated the use of a number of voice talents and a level of recording quality which were beyond the scope of this production. Since none of the nations involved in the adventure speak English as a first language the issue of using English, accented English, or subtitled native languages was also avoided. To minimize the impact of the dialogue boxes which were used instead, the boxes disappear when the next character speaks, but can be brought back before the player responds to make sure nothing is missed.

Another factor in creating a realistic immersive environment is the inclusion of useable objects. Including objects in a scene which can be utilized by the player enhances the illusion of depth and realism in the environment. It also allows the player to treat the mouse as an extension of the hand – reaching for and grasping objects and then using them. In the Strategy Tent, the character is able to reach for the map or the gold watch on the table. When conducting the battle, the player is able to pick up and move the army units in order to deploy them. The map is set up in a perspective view, giving the player a feel for the terrain and area of the battlefield.

The final component of the immersive environment is the ability to talk to other characters in the text. To fulfill this need, two modes of conversation were included. In the first case other characters initiate the dialogue. As in the scene which occurs once the character returns to the Drop Room from Oklahoma, the player finds that the scientist has already started talking and is presented with a dialogue box. As in all cases, the player can find responses by moving the cursor to the bottom of the screen and activating the

player's window. The second type of conversation is initiated by the player. This type is found at the sentry post in the French Camp. The player sees a scene with a guard standing by a fire. After a little experimenting, the player finds that the only option is to click on the guard when the cursor becomes a cartoon talk bubble. This is the equivalent of gaining the guard's attention and is necessary since a soldier would never presume to start up a conversation with an officer. This format adds realism not only by the fact that it allows the player to communicate, but it also respects established social hierarchies.

Developing Curiosity

The third aspect of motivation is curiosity. In trying to develop a feeling of novelty, it was necessary to develop a compelling story and sense that things were happening outside of the ordinary. In this case, the compelling story involves a graduate student who is enrolled in a program that sends people back in time to study events from a safe distance as they occur. Only this time a watcher inadvertently causes an accident which, if left uncorrected, could drastically change the course of history. As if fixing history was not task enough, the player soon realizes that the only solution is to successfully lead the French army against a combined Russian and Austrian force.

The pretext for the adventure definitely falls outside the realm of the ordinary and it is up to the player to gather the necessary information for victory while experiencing the game. Fortunately, this out-of-the-ordinary experience is as intense for the character as it is for the player, helping to link the two and not really serving to hinder the player. In this way, confusion actually helps the player feel a part of the story and does not serve to dampen motivation.

Since the research showed that curiosity can also be driven by introducing unknowns to the experience, an effort was made to include unexpected turns to the plot. This was

achieved by setting up the player to expect certain patterns but then delivering something completely different when the time came. For example, once the player arrives at the French encampment a pattern of movement and dialogue becomes apparent. The player can move the character from scene to scene and talk to people along the way. Just when the goal of the travel, the Strategy Tent, is in reach, a quite unexpected event takes place – the character is run over by a wagon. This unexpected event is then compounded when the character regains consciousness and discovers that due to the accident the army is now without its famous leader. For some players, this could be enough to cause cognitive dissonance, but the design is such that explanations and a moment to catch one's breath are available to calm any turbulence before this occurs.

Another way to keep the player somewhat in the dark and to keep the game from being completely predictable is to avoid giving too much information at the beginning. Even more effective is to let the player feel prepared by supplying a package of information, but to negate the value of that information once the first steps into the experience are taken. In *The Watcher*, the player is given a short introduction that sets up the situation and the premise of what the player is to do. But once the adventure begins, the player finds that he or she is not in the Austrian Empire but rather the Oklahoma Territory. The player is found to be in control of a character that is unprepared and strangely dressed for the current environment. Any background reading, school preparation, or previous knowledge concerning the Napoleonic Wars is, for the moment, worthless. The sense of preparedness fails, and the adventure no longer seems to be the easy observation mission it once was. Since this is an educational package, the lessons and reading do eventually come to bear, but for the moment the player must switch to luck and instinct, survival tools of the most basic level.

Motivation through Control

As Table 4.1 shows, the final aspect that drives motivation is control. The player needs to be in charge of events, not an inactive passenger. One way to achieve this is to allow the player to issue orders. In *The Watcher*, this happens in the most direct sense when the player is placed in control of the French forces at the Battle of Austerlitz. Although the player is sequestered in a tent and away from the actual battlefield, it is the player who decides what strategy is to be followed and where the units will position themselves. Due to the realities of 19th century warfare, the player's commands may not always be followed to the letter, but the sense of command is clear.

In a less authoritative sense, the player is also in control of the character. The player decides what actions the character will take or what will be said in a dialogue. Granted, the choices are limited by the design of the game, but with a broad enough palette of choices, the player should be able to pick one close enough to the desired position. While traveling in the back of the covered wagon, the player has three opportunities to "try" the gold watch or to continue conversing with the settlers. A cautious player is able to delay the mysterious action until there is no other choice. A bold player can act on gut instinct immediately if desired.

Another helpful component for feeling in control is to not have choices or decisions questioned by others. What good is having the power to decide if no one respects the decision? For this reason, *The Watcher* is placed in a military setting. In this context, it is not unreasonable for the other characters to follow orders unquestioningly. Even if the player makes unwise or unconventional moves during the battle sequence, the soldiers will respect the commands of their leader. As mentioned earlier, thought, the desire of the soldiers to follow orders exactly and their ability to do so are two different things. Built into the battle scenario are features to add this realism. For instance, in the early

1800's, army units communicated through the use of runners. Therefore, depending on whether these messengers are delayed or even killed, the headquarters staff can receive spotty or conflicting reports. Conversely, commanders in the field may or may not receive updated orders in time to act, or new situations may prevent them from taking the desired action. During the battle, the player will discover that despite what orders are sent, a unit that has seen a lot of action may be hesitant to charge into the fray again, or may charge in and right back out again. Other times, it may seem to the player that a unit is still fighting even once the enemy has been destroyed. This reflects the fact that an updated report has not arrived from that unit indicating its current status. So while it is important to put the player in a position of authority, it is unrealistic to make them omnipotent, especially in an educational situation where experiencing the hardships is part of the lesson.

Creating an Experience

The next key to making sure that *The Watcher* accomplishes its goal of being an educational tool is the experience it helps the player to create. Below, Table 4.2 illustrates how experience was analyzed and how this analysis led to parts of the game's design.

As the model in Figure 3.1 illustrated, all the motivation in the world will not lead to learning unless the appropriate experience occurs. So while experience only has two aspects to it, its influence can be seen throughout the design and is also the most difficult of the three to incorporate correctly.

Table 4.2: Design Key – Experience Extended

Aspect	Design Principle	Design Component	Example
Transaction between individual (reader) & environment (text)	Subject position	• Theme and horizon • Familiar vs. new	• Start as cautious student, end as veteran time traveler
	Asymmetrical, contingent relationship	• Extent of previous experience • Rate of revealing new information	• Classroom knowledge of Napoleonic era • Mysterious, not frustrating
	Cumulative effect	• Current experiences prepare the user for experiences to come	• Land Rush experience prepares player for more important Austerlitz experience
Significance	Meaning creation	• Blanks • Negations	• Movement from scene to scene • Napoleon injured/return signal not working

From Iser's work, it is clear that in order to ensure that a person experiences the text in the way the author intended, it is up to the author to maneuver the reader to the correct subject position. One way to achieve this is to be aware of the readers' current subject positions and tailor the text so that it can maneuver different kinds of people to the same experience. Another way is to make everyone's previous experiences irrelevant, essentially by starting everyone with a blank slate. This is the approach used in *The Watcher*. Regardless of how much a given person knows about the Napoleonic Era, or how experienced another person is with computer war games, it all becomes extraneous when the player is suddenly faced with being stuck in the back of a speeding covered wagon. Regardless of their backgrounds, all players will be confused. It is from this point of confusion and lack of direction that *The Watcher* slowly brings the player to the desired subject position from which to experience the text of the game.

As illustrated in Table 4.2 above, the text is designed to move a player from being a cautious and confused student to being a confident, veteran time traveler. As dictated by the age group this program is designed for, the role of student will be quite familiar to all users of the game. From this familiar position, a bit of confusion is added, putting the player in the same mental state as the character being controlled. Slowly, and at a pace controlled for the most part by the player, information and situations are revealed that gradually help the player adapt to and develop an understanding of the game environment. Using the technique of theme and horizon, the player learns not only how to interact with the environment, but begins to piece together how the world works and what the player's place in it is. The function of the gold watch is realized, the details of the mission are outlined, and the importance of the player's role in history soon becomes evident. All of this is developed within the game environment, through elements of the game, and does not rely on what the player brings to the game.

This is not to say that a strong background in the historical era in question would never be useful. Such knowledge is extremely helpful in understanding events once the character arrives in the French Camp, and is especially useful in waging war against the Russians. In fact, this is particularly helpful in illustrating the asymmetrical contingent relationship that exists between the text and the reader. By asymmetrical, Iser means that in the relationship, one side holds power over the other. In this case the text is the deciding factor in how the experience will unfurl. As shown in Table 4.2, the structure of the text determines the rate at which information is revealed to the reader. The rate at which information is revealed determines how much freedom of interpretation the reader has in making sense of the text. *The Watcher* is designed to be mysterious, but not frustrating. The object is not to make the player give up and surrender to the computer, but rather to make the player earn the knowledge that is revealed and to reveal knowledge that will prove useful later in the game as well as later in life.

As a contingent relationship, the experience created through the text is influenced by the particular reader. As mentioned earlier, previous experience with computers, military history, or the Napoleonic Era will prove helpful at some point in the game and will serve to deepen the experience had by the player by allowing that person to create connections and meanings on multiple levels. While these previous experiences are not necessary for success in the game, they do affect the richness of the experience and serve to vary the results from person to person. It is believed that in a classroom setting, the teacher would ensure a basic knowledge of the events to be experienced so that most of the students would have similar starting points prior to experiencing the game. Then again, part of the learning experience would be comparing results after all students have a chance to play *The Watcher*, with players not only recounting the events that occurred, but also what they were thinking at the time.

Just as the player is prepared for understanding the experience of the game through the use of theme and horizon, the player also learns from the game by building one segment upon the next. The relatively safe Land Rush segment allows the player to experiment with the interface and adjust to the world of the text without any undue pressure of a ticking clock or threat of harm. By the time a player has dropped back to the Drop Room, he or she should be comfortable with how things are seen, touched, and talked to. In the Drop Room, the player receives more factual information, interacts with more characters, and interfaces with more devices. The concepts of making decisions, listening to the subtle advice of other characters, and pertinent information about the ensuing battle are introduced. For example, the player is given the opportunity to review information before trying to drop into Austria again. If the player decides not to bother with the information, the character is allowed to continue, although given one more chance at the launch control panel to change his or her mind. If, however, the player

decides to accept the offer of more information, the scientist responds with praise for the player and a wealth of information that will help in the battle to come.

Adding Significance

The other half of experience, and this has already been touched on lightly, is that it allows a person to assign a personal significance to, or create the meaning of, the experience. What is significant about the design of *The Watcher* is that the structure of the narrative has been meticulously laid out to focus the player on the one desired significance of the experience. The player is groomed along the way so that a particular meaning will almost always result. The particular meaning is an understanding of the conditions under which Napoleon and his army operated and of how external factors, as well as Napoleon's own intelligence, led to his victory at Austerlitz. Rather than being told Napoleon was a tactical genius and that his soldiers worshipped him, players are able to walk through the camp, talk to the men, and see how easy or difficult it is for someone to have the resounding victory that Napoleon won that day.

In order to guide the meaning creation along these lines, certain structural components needed to be manipulated. These pieces are Iser's blanks and negations. The player who concedes his or her subject position to the game and flows with the narrative will accept the ideas of time travel, of preserving history, and of the fact the France must win the battle. This player will join scene after scene with blanks. The progression of the story will make sense and experience will proceed unhindered. A player who accepts the terms of the game and plays along with the role will find victory and praise at the end of the adventure. The timeline is saved and all is as it should be.

The player who resists the desired experience of the game – attempts to avoid the responsibility of command or tries to let Russia win the battle – will find that objects do

not work as expected, that helpful characters will turn on them, and that the experience will not be as enjoyable. These are negations. While the attempted action may make logical sense to the player and seem as justifiable as the actions taken by other players, it runs contrary to the experience meant for the player and therefore causes a disruption of the flow of the experience. The player is forced to rethink the actions or line of thinking that led up to them. This can be as simple as choosing a different option or as complex as forcing the player to restart the game. The player who continues to fight the desired experience will find that in the end the Russians will overrun the camp and that Napoleon himself will order the arrest of the impostor who has lost the day for his Empire. Not only is the player now in danger of the French as well as the Russian armies, but history has been altered so much that the return device, the gold watch, no longer functions and the player is doomed to live out his or her days in 19th century Europe.

Allowing Problem Solving

The final key to the design of *The Watcher* is problem solving. Outlined in Table 4.3, below, are the elements necessary for an effective problem solving environment, as described by Merrill, and examples of these elements as they appear in the design of the game.

Table 4.3: Design Key – Problem Solving Extended

Aspect	Design Principle	Design Component	Example
Intellectual Involvement	Challenge	• Rise above confusing situations	• Win the battle
	Surprise	• Unexpected events	• Drop to wrong time period • Forced to lead battles
	Obstacles	• Dead-ends • Pitfalls	• Return signal unreliable • Lose battle - stuck for life
	Role-play	• Personality building • Emotional links	• Acted from player's POV • Honor of victory • Feeling of responsibility
User Importance	Events result from user action	• Choose paths • Choose responses	• Preparing for drop • Dialogue choices
	Computer waits for user	• Scenes wait for input • No time limit • No interruptions • No feeling of helplessness	• Player free to explore each scene before reacting
Task Creativity	Not just one answer	• Fight battle as you wish • Correct decisions rewarded • Incorrect decisions explained	• Player moves units • Sentry compliments player • Sentry remarks to player
	Free to experiment, observe, formulate, initiate	• Ability to change decision paths before committing • Visual feedback	• Very important decisions include a double-check • Live changes to battle map
Program Variability	Different forms of interaction	• Narrative • Conversation • Physical	• Navigate world, use objects • Choices, people • Move objects, interact with limited resources

Some of these elements are straight forward, such as the challenges provided by the struggle to navigate in the different time periods successfully, or need to win the battle. To add surprise to the structure, events such as the mistaken trip to the Oklahoma Land Rush and incidents that put the player in charge of the French army were developed. Obstacles in the form of dead-ends and pitfalls were also included. These obstacles dictated the need for the return signal watch to cease functioning once history was

altered, and the fact that if the battle is lost the player has no future to return to. Rounding out the principles that stimulate intellectual involvement are elements of role-play. As Table 4.3 shows, this includes elements for personality building, such as playing the game from the character's point-of-view, and the formation of emotional links, such as the sense of honor that comes with victory or the sense of responsibility that comes with disrupting the time-space continuum.

User Importance

The second aspect of problem solving to appear in the game design is user importance. Maddux says that in true problem solving situations, events result from the actions of the player, not random circumstance. In *The Watcher*, the player is constantly given choices as to what the action or statement will be. The player chooses whether to leave Oklahoma or to talk to the settlers. The player decides when he or she has reviewed enough information to drop into Austerlitz. The player also decides who to respond to other characters throughout the narrative.

Along this same line, the computer is subservient to the player. In some game designs the computer controls the action and it is up to the player to keep up. Since in a problem solving environment the player should have the upper hand, in *The Watcher*, the computer waits for the user. There is no running clock, no feeling of pressure or helplessness. Each scene waits for some form of player input, whether it is a choice from a dialogue box or an action on the screen. None of the scenes have a default timer that causes the story to proceed without the player. Even the battle segment is turn-based, giving the player as much time as necessary to make considered tactical decisions. This type of design allows the player to explore each scene fully before deciding on an action.

Ensuring Task Creativity

Also key to problem solving is the ability to perform tasks creatively. For this to be possible, allowances must be made for more than one possible answer. In *The Watcher*, the players are allowed to run the battle any way they wish. The soldiers will follow orders to the best of their ability, and will not question authority. Either the French win the battle or they lose. There is no degree of success, no point tally at the end. Even if the player's solution results in just one French soldier left standing, it is a full victory. Earlier in the narrative, as the player is meeting other characters such as the scientist and the French sentry, the conversations lead to decision points. In these cases, the player is rewarded for good decisions with praise or admiration from the other character. For example, deciding to review more background information before heading to Austerlitz, results in the complimentary comment "You are smarter than you look" from the scientist. If the player makes a bad decision, instead of a penalty, the player is told the correct answer and given an explanation. In the French Camp, if the player does not understand the tactical value of fog, the sentry explains it and then remarks on how wise Napoleon was to assign the player's character to the supply train.

Most important in a problem solving environment, though, is the ability of someone to experiment, observe the results, formulate revisions and initiate needed changes. This is available in *The Watcher* both while the player is traveling around and in the heat of battle. At important moments like the time drops, the player always has a second chance to abort the drop. In the lab, the player need only hit the "abort" button, while in the field the player need only choose to not click on the watch once the character's hand swings out. On the Map Table, the player has complete control as to where the French forces deploy and reroute them to meet any changes in the battle. Also, the map provides a real-time feedback of what the French and Russian armies are doing as a result of the player's orders.

Program Variability

Maddux's last aspect of problem solving software is program variability, the characteristic of having a number of different forms of interaction between the player and the computer. As seen in Table 4.3, *The Watcher* can be described as having three different types of interaction: spatial, conversational, and physical. In the spatial mode, the player is moving the character from scene to scene, navigating through the narrative's world. The conversational interaction occurs when the player is manipulating the dialogue boxes and clicking on other characters in order to gain information from them. Physical interaction occurs between the player and other objects, such as the watch or the army units, that are used by the player to achieve desired goals. These types of interaction are found throughout the game and often appear together. For example, in the Drop Room, the player conversing with the scientist through the use of dialogue boxes, can, at the same time, access information about the army leaders on a small monitor, or initiate the drop sequence using a control panel.

Chapter V:

EVALUATION AND DISCUSSION

As illustrated earlier, the design model for *The Watcher* was based on motivation, experience and problem solving. The objective was to create an educational software package that presented students with an opportunity to experience an historic event and develop a personal set of meanings from that experience and an opportunity to apply the created meanings in a problem solving environment. To test the effectiveness of this design, the prototype version of *The Watcher* was given to 21 college students trained in multimedia production for them to test and review its effectiveness. The reviewers were given ample time to run the program and were then asked to complete a 17-question survey which asked them to comment on the major design aspects as they were incorporated into the game (see Appendix C).

Effectiveness of Motivation

From the responses, the motivational components of the design seem to have been successful. When asked if they were challenged by obstacles or surprises, most of the respondents agreed and were able to cite a variety of occasions. The most common citations referred to the early part of the adventure where the player was found to be in the wrong location (the back of a covered wagon) or the result of clicking on the gold watch (time travel).

The beginning was a surprise. I thought I had messed up at first. Then I understood it to be part of the story.

Mostly, I was surprised at how the game started and the time travel. The interactivity was also surprising – it was nice to have some choices on the path through the game.

Others were pleased to find they could participate in the events and not just watch. One person even cited the interface as an element that added to the challenge aspect of the game.

Yes, I can play as a castmember in the war (to participate in the history).

Yes, it was surprising to be able to “lead” the French Army.

Those who did not find *The Watcher* surprising or containing obstacles said that it was too straight forward or needed to be more challenging.

No, I didn't find any obstacles, everything seemed straightforward. Entertaining, but straightforward.

I felt that no matter what I picked I would still get to the end of the mission. There was no challenge to pick the right course.

The majority also favored the effectiveness of the fantasy elements in the design. While some mentioned they needed some time to settle into the part, those who were able to identify with the character cited a variety of reasons.

After I realized what was going on, yes. The “homebase” scene(s) and the army tent scenes were nice to look at and comfortable.

The world was not even a question. The character aspect – great. That part was totally clear and easy to understand.

The interface controls were self-explanatory...easy to get into the game as opposed to getting hung up.

Able to identify with main character because I was able to see what he/she was seeing – the whole game was based on that 1st person point of view.

The personality of the main character (sarcastic, problem solving) was easy to identify with...

The last comment is interesting since the writer was able to identify two facets of the character. The first, sarcastic, is only one of the options available to the player. The fact that the player assumes it was the only option attests to the successful way in which the player is able to shape the character through choices made in the game. The second, problem solving, is a good indication of how the player categorized the experience provided by *The Watcher*.

On the other hand, some people did not have such an easy time identifying with the character or losing themselves in the created world.

Not really. The user interface was kind of cartoonish. Photo-realistic elements and interface would have been better.

No. I did not find myself lost in this product. The concept was good, but I was fully aware of my real surroundings.

Except for a few people, the vast majority agreed that *The Watcher* was able to spark the curiosity of a player in many different ways. People cited the conceptual idea of time travel, or the issue of interfering with history as one factor. Others focused on specific elements, such as the gold watch, the battle map, or the opening scene in Oklahoma as reasons for being curious about the game.

I think the time watch was a good idea. It kind of made me want to see other choices. For instance, going back to pre-historic time.

Yes, to see the other outcomes. Played game for second time to see what happens.

I knew a little about this war and wanted to see what situations might have arose.

Those whose curiosities were not touched blamed it on a lack of depth in the game, or the fact that the player was never in one place long enough.

I didn't really understand what was going on in the beginning sequence – leading up to the battle. The wagon scene wasn't long enough, couldn't move around.

The final aspect of motivation is control. Here the division of the answers was not as strong, but most expressed a favorable opinion. In general, the reviewers felt that while there was an ability to control the character in the game, there was much more control afforded during the battle. This is a possible indication of the problem solving effectiveness of the battle scene and its need for more player freedom in order to plan and execute creative tasks. The comments focused on the rather limited choices available for character action and the fact that regardless of the choices made the story still flowed to particular, unavoidable points.

I didn't feel like I was in complete control because the game, even though there were choices, was still linear. Maybe allowing the user to type in answers or responses would give the user a better feel that he is under control.

I felt I was just controlling his spoken dialogue and not his actions. If allowed to move around the camp freely, then I would have had a better sense of control.

I felt totally in control but it was apparent there was some guiding towards a specific goal.

At times, especially when moving the forces. At times not, because [the designer] did have to direct the players' direction to a certain extent.

The options give an appearance of control however it seems as though you actually don't have much choice.

Rating the Experience

Five questions were then asked regarding the experience of the game. There was a definite split as to whether the reviewers believed that events early in the adventure

prepared the player for events later on. Those who did feel this way cited the ability to learn the interface and the background information given in the briefing.

I think the beginning helps the user understand how the interface works.

Yes, using the watch helped explain its function early on.

Somewhat, I learned the general interface and how to receive messages.

After I figured out how to do something the game went smoothly.

The intro is quickly forgotten, and doesn't seem important though it does set the stage for the metaphor.

Those who did not find the earlier parts of the game helpful later cited a lack of information or too much confusion for it to do any good.

Beginning scenes were confusing and I also clicked a few times when I did not want. Therefore, I did not know what was going on until I got to the "base."

No, I was very confused at the beginning. Like I stated before, I was unclear/confused as to where this was all leading to. Maybe I wasn't paying enough attention or I was expecting something else to happen. What that was – I have no idea.

The feeling that people were confused by the design increased when the majority stated that they spent more time confused than having fun. From the opinions in both camps, though, it is clear that when people were confused, it was in the early part of the game which relied on the newer, theoretical design, as opposed to the battle scene, which used a more traditional interface. Since people who were confused tended to suggest adding more traditional elements to the interface, it is possible that these people were unwilling to surrender their subject-position and therefore could not experience the game from the designed point-of-view. This is also an excellent example of people not realizing a negation and treating the textual linkage as a blank. Instead of re-evaluating their situation and examining what has been revealed through the text, these people insist on sticking to what they consider as "normal" or "right" and are puzzled when it does not

make sense. This process is illustrated in Figure 2.1. In refusing to adapt their existing knowledge and experience with multimedia adventure games, some players could only form syntagmatic links between scenes, what Iser calls blanks. This is represented by the connection of Concept A to Concept C through Concept B all on the same plane. Had they not been so entrenched in their thinking, some of them may have been able to adopt a new navigational system, or might have been willing to resist imposing meanings on the situation until enough facts were revealed. These paradigmatic changes are Iser's negations, and are represented in Figure 2.1 by the vertical shift made in Concept B before linking A to C. In the case of *The Watcher*, it would appear that the players were faced with too many negations early in the experience. Without time to form successful chains of blanks within the game experience, they had no choice but to rely on previous experience to get them through the vague areas, but this only served to draw them deeper into confusion since those experiences were based on a different paradigm.

Another possibility is that despite its status as a relatively new textual medium, there has been enough time for people to develop deeply embedded expectations of how multimedia "should" work and therefore see any changes as mistakes and poor design rather than opportunities to use an old system in a new way. Under these circumstances, it is the responsibility of the author to spend more time easing the readers to the new position. It takes more effort to break the stronger roots.

I was confused as to what I was supposed to do in the beginning and at the battle. The game itself was humorous.

It was mostly confusing, there were few visual clues for where to proceed. There were a lot of graphical elements on screens that did absolutely nothing when clicked on. Hiding options at the bottom of the screen is mean to the user. Speech balloons should have been used.

I was confused in beginning sequences – the wagon, the strange room with a man – before I became a soldier. But once I was at the camp, I started to get a grip on what was happening. Then I started to have fun and enjoy the product.

I was amused with the game, but also felt minor confusion when dumped into the [wagon] with no explanation of controls.

I would just keep the bottom menu showing at all times – it's the main navigation item anyhow.

One item regarding the contingent relationship between the players and the game became abundantly clear: All but one agreed that nothing they learned in or remembered from high school history classes played any part in the experience. Any information needed for success was be found within the game. One person said that knowing the general history just provided a fuller backdrop for the experience.

No, I don't remember much about Napoleon, but the game does allow the user to learn more about the history before zapping back in time.

No, and if they did I cannot remember.

I didn't feel I needed any knowledge of the subject before I played.

No, I knew little of this war from previous experiences.

High school? Not at all. I did actually learn about the battle just from this demo. Seriously.

My high school history classes told me nothing of these events. Info provided at front end of game adequately set the scene.

On the other hand, people's responses did indicate that having substantial experience with other computer wargames did affect their experience in *The Watcher*.

I'm really into the multi-player games, i.e., *Warcraft*, *Doom* and such, where you are playing your friends and trying to beat them. I think this game would be really cool if in the war scene you played with your friends.

I have played various wargames before and I was motivated to win. I thought that I could overpower the enemy with group attacks and it proved useful.

I think you could have included some war footage, if available, to depict the actual fighting. Also, a casualty count would be a good way to gauge a death count.

Having examined their previous experiences, the reviewers were next asked about the effectiveness of the experiences offered by *The Watcher*. Responses tended to be of the opinion that while the design was effective in imparting a feeling of what the atmosphere and conditions in the French Camp were like, there did not seem to be enough details to attain a full feeling of what the life of a soldier was like.

[As a soldier] you were at the mercy of the general and his strategy. If the strategy was not good, you probably died.

The environment and atmosphere were good. Real nice sense of place.

The map limitations especially demonstrated how small battles were geographically, and how quickly things changed.

The only “bond” I felt with the soldiers was the fact that someone else was calling the shots. The game didn’t touch upon their lifestyle, habits, etc.

The horror of war was not expressed. This seemed way too light-hearted to me. The only thing that hinted to the intensity of the whole situation was the expression on the soldier’s face.

Maybe [add] some type of training procedure either on military attacking style or something like that.

From comments of this type, it also became clear that the reviewers were uncomfortable with the idea of being unprepared for the battle sequence. They seemed to prefer the subject-position of the omnipotent, omniscient commander rather than that of the lost graduate student who stumbled into a situation that is getting out of hand. They seem to believe that players should be told everything up front and then be allowed to perform a task at maximum efficiency instead of learning as they go and improvising along the way. Clearly, a design such as the one developed for *The Watcher*, would not be effective for teaching such people. Unless they are willing to surrender their position and accept confusion and surprise as part of the designed experience and not a game design flaw, they run a much greater risk of never experiencing the game as it was designed and therefore are likely to miss the knowledge it is meant to teach.

Central to the ability of the game experience to teach is the effectiveness of negations and the ability of the player to successfully change paradigms as indicated by the meanings developed during the game. Many of the reviewers were able to recall at least one time where an unexpected event took place but after a little thinking were able to see the logic behind the outcome and incorporate it into their personal schema. Most of these comments centered on the scenes leading from Oklahoma to the Drop Room.

The beginning wagon scene. I had no idea what it had to do with war or Napoleon. Now I understand it and it makes sense.

When I clicked on the watch and it brought me back to the future. It made sense in hindsight.

Going back to some scientific lab after the Land Rush threw me off even though I understood it after the fact.

I thought that if I moved the soldiers anywhere on the battlefield then they would go there. But then I got the warning screen. But that warning screen made sense as to why you can't move things so far away.

From the early examples, it is clear that players were able to experience unexpected or inexplicable events, such as looking at a pocket watch and being whisked hundreds of years through time and make sense of them given the context of the game. Comments of the later type show that participants developed a sense of the effects of time and distance on strategic thinking and that one must plan ahead and act now for results desired further down the road.

Encouraging Problem Solving

The third piece of the design is of course problem solving. It is imperative that the design encourage and facilitate the players' ability to apply creative problem solving techniques not only to solve each dilemma, but also to sharpen their skills through continued use of them. As mentioned earlier, part of the problem solving equation is engaging the player through intellectual involvement, part of which centers on role-playing. The testers were asked about the degree to which they formed an emotional bond to the main character and the outcome of the game. There was a fairly even split between those who felt the game was nothing more than a lot of mouse clicking and those who became involved enough to care about the outcome. Of those who felt the game was just a series of clicks, most of this stemmed from the format of the battle sequence.

Towards the end it became a lot of clicking because of the extreme redundancy in the battle style.

Both, but the battle was confusing. I didn't know if I was doing well sometimes.

Just a lot of clicking. There was very little guidance on what to do.

I wanted to defeat the other soldiers, but it eventually degenerated into a bunch of clicking.

Lot of clicking until map strategy thing. Then it was kind of cool. This part of the game should last longer and be more challenging.

The majority of the time I was just clicking. I only cared about the outcome of the fight.

Those who cared about the outcome concentrated more on the scenes before the battle or at least treated *The Watcher* as a whole instead of a game inside of a game.

I really did have an interest in the outcome. The constant updating helped to make it go more smoothly.

I cared, wanted to have the correct outcome.

I guess I really wasn't into the whole thing from the beginning. I was mainly confused, but once things got clearer it became more fun. I think I cared more because I understood what was going on.

I like to win!

Another factor that impacts the effectiveness of a program's problem solving environment is the effectiveness of imparting a sense of importance upon the user. Unfortunately, *The Watcher* does not seem to be very effective in this sense. Over two thirds of the reviewers felt they were more like passengers along for the ride, rather than important factors in the outcome of the adventure. Part of this feeling is apparently based in a sense that the tasks at hand are not challenging enough. Many wondered if it was actually possible to lose the battle. Others felt there were not enough penalties for doing wrong for doing right to feel like an earned achievement.

If the game were less linear or if the battle game was harder, I would have felt more important had I won.

If there were more options and maybe if there were greater stakes, i.e., playing other students in the war scenario.

I felt like a passenger. There should be negative outcomes for negative actions. It seems liked everyone made it through at the same time.

I felt like a backseat driver. I felt that I would have to be an idiot to lose and that all I had to do was answer questions the way I was told to do so.

Those who did feel important to the outcome based their opinion on their responsibility for conducting the battle.

I actually felt responsible for the outcome. By being able to control the troops in the battle section I felt more responsible for the final outcome.

As would be expected, this same feeling of a lack of importance led many people to remark that the experience was more like following a recipe than using creative thinking.

Those who did cite an ability to use creative thinking referred to the battle sequence, which was designed just for that purpose.

In the battle scene I felt like I was being creative.

The battle seemed strategic and creative.

The war scene allowed "home cooked" strategy.

Most of the game was a recipe, but the battle sequence took a little bit of strategy. The limited choices is what made it a recipe.

The comments from people who felt that overall the game was just a big recipe faulted the limited amount of choices and restricted ability to move the character.

Only the fight allowed free thinking. Should allow free movement through the camp and base.

Most of the options went back to what the program wanted me to do.

Interactivity was severely limited. There were few options to each screen.

This also coincides with an overwhelming feeling of being trapped in the decision making process, though few people blamed this feeling on the limited decisions available. More often it was an inability to backtrack along the decision tree to choose a new path. While this ability does exist in many computer games, it does not add to the sense of realism or enhance the program's ability to present a realistic experience. In life, once you make a decision you have to live with the consequences, there is no undo. This was considered while *The Watcher* was being designed. Rather than having the artificial ability to undo life decisions, *The Watcher* does incorporate a number of double-checks to make sure a person is resolute in following a certain path. This seemed to be adequate for two reviewers.

Trapped? No. But it would have been cool to be able to go back a couple of screens and choose a different answer.

I did not look back after choosing the wrong/right decision.

For the rest, however, exposure to less realistic program designs and a desire to test all the options for the most effective answer, resulted in a feeling of being trapped. It also appears that the interface was not completely clear to some people as they did not know that clicking on characters would allow them to see what that character had said if they want to read it again.

I felt trapped. There is no way to go back if you did not read all the text.

Once you made a decision that was it. The game continued.

I didn't see any means to go back.

Felt like you were funneled to make certain decisions.

I didn't feel that there was room for a second chance. Also, I, at one point, accidentally double-clicked during a conversation and was not able to go back to read what had been said.

The only time it looked like I could change my mind was the "abort" key on the transporter.

Despite these shortcomings, most of the reviewers were able to state that they did not get bored while experiencing *The Watcher*. Citing elements such as sounds, interaction and strategy, the reviewers felt there was enough program variability to maintain the player's level of interest.

The music and sound effects were catchy. The plot was also interesting.

I liked the interaction of moving the troops.

I wanted to know where it all led to. See where everything would go with the choices I made.

There was a goal. Getting rid of the enemies.

It was fun to play.

Moved quickly and scenes varied substantially. Consistent (good) feeling of "what do I do here?"

Those who did tire of it felt it lacked an element of realism or depth.

A little bit. I think it should be more realistic.

Live action and better graphics would be nice.

Not bored, but I wish the intent was more direct. I wasn't sure what to do. But I had a good time once things started happening. I felt like there was more there that I was able to do, but just didn't.

I really expected there to be pauses throughout the battle giving me more details about the battle, the various generals involved, etc.

Another sign of the design's success came with the revelation that most of the reviewers would have liked to use this in high school had it been available. Those who did not tended to measure it against the advanced action and multiplayer capabilities of today's entertainment programs. No one seemed to have a basis for comparing *The Watcher* to any educational packages whether from high school or the present.

A hell of a lot better than history class. Even now, I think it is better than IAH 201.

Sure, if a lot of time is spent discussing what the game is about. That point in time. Having a pre and post lecture would be good.

Maybe. Never had anything remotely close to this in high school so I truly have no idea if I would like it or not.

Would have made things more hands-on. Not as serious as a lecture or reading out of a boring textbook.

Effective in displaying or teaching about what happened historically, while at the same time it was like a game.

Using computers makes learning less tedious.

I think this game would be really cool if the war scene was played with your friends, maybe each person controlling a group of soldiers.

There isn't much learning value to this. Sorry.

There have only been a few games that have appealed to me. I like more of a challenge, not a game that walks me along like a mother.

Classifying the Experience

In the end, it was not surprising from the range of comments, that the reviewers were not able to agree on how to classify *The Watcher*. Opinion was evenly spread between entertainment, educational, or a mixture of both. Those who labeled it entertainment felt that there was not enough factual depth to consider it educational; perhaps remaining closely bound to the traditional concept of education.

I think it felt like a game that teaches you something, even if it 's only a little bit.

Entertainment, I really didn't learn too much.

It would be fun for a kid, but the education didn't seem to be the main point.

It's a fun way of learning, yet more history should be involved.

Those who were able to tag the program as educational cited the facts and the preparation of the circumstances.

It seemed more like educational, because it established the circumstances before actually starting the battlefield. There were a lot of boxes with dialogue stating the facts behind the scenes.

It seemed educational. It tried to be entertaining, but I think you need more work in this area.

Of the three, calling it a hybrid of both elicited the most comment. Some cited that the program could be divided into an educational program that led into a game, while others saw it as a melding throughout.

Both of them, and that is what makes me think this is a very good idea, "learning while playing." But this game (educational software) will have to compete against [pure] games in the markets.

The events leading up to the battle seemed educational, but the battle itself seemed more like entertainment software.

A good mixture of both. It could capture the audience's attention and inform them.

It seemed entertaining...but there was an obvious historical content. But it really was fun, once things became more understandable (through repetition).

Seems like a hybrid of both. It uses the medium of entertainment while jokes into facts.

Hinted educational because of facts, but facts seemed sparse enough that they may have just been "setting the scene." You're in the gray zone – don't know if this is where you want to be, but I think it needs more educational content.

Conclusions

While it may not have hit a bullseye, *The Watcher* does not seem to have fallen too far from the mark. The motivational aspects of the design seem to have received strong praise from the experts, but their receptiveness to some of the experiential and problem solving elements were lackluster at best. On the other hand, it would be premature to state that these opinions originate from the failure of the elements themselves. For example, reviewers tended to interpret the early confusion in the game as a design flaw, not an emotion that was deliberately being fomented. For these players, the rest of the experience was, by their own admission, tainted and thus suffered low marks. Fortunately, most of those who were confused early on admitted they were able to gain a grasp of the situation around the time they arrived at the French Camp, which is exactly what the design called for. Through their comments, the players were unwittingly showing the success of the experiential components, even if they did not agree with them.

This, however, brings up a different point: If one is successful in creating emotions that turn the player away from the game, is that a success? I would say not. The flaw in *The Watcher* is not how the experience was developed, but which experiences were targeted for development. I did not anticipate such a strong inability to accept the confusion nor the players' desire to maintain deity-level control in a computer game as

opposed to human-level. In the future, to ensure the success of the game and its attractiveness to players, I would emphasize different emotions in the beginning that the players are more comfortable with, such as control and preparedness.

Judging from their opinions, some people also lost sight of the fact that this version of *The Watcher* is only a prototype and only included enough material to showcase the theoretical designs as they could be incorporated. The reviewers, however, do bring up an important point. For the game to be successful in a school environment, more detail would have to be incorporated into the conversations and events that occur throughout the adventure. Conversations with the sentry and the sergeant would have to be lengthened in order to flesh out the characters and include more anecdotal information.

What is important, though, is that even with interface and depth issues, the structure of the narrative was able to ease students from unexplained events to understood events without having to state the explanations outright. The students were able to compile the information presented to them and rework their own schemas until it all made sense. Exercising that mental ability alone makes *The Watcher* a worthwhile investment. For while a student may gloss over a passage in a history text that is not fully understood, the spirit of competition and pride in the game requires the players to gather up and retain every morsel of information, never knowing when they are going to need it to overcome an obstacle. The reviewers made this point themselves when they complained that there was not enough information available or that they were confused when nothing happened when they clicked on boxes and sacks and tried to rifle through the sentry's pockets. Players have already been conditioned by past games to treat everything that is revealed to them as possibly important. If anything, the opposite is true of school texts. Most students do not expect to encounter anything of value in them. Here too, the reviewers

were quick to remark that despite any flaws the game was more interesting, if not more effective, than the books they used in high school.

One issue that does need to be revisited and reworked is the level of challenge presented to the player. While it may be the result of presenting the game to trained multimedia designers who may tend to have more experience with computer games or the fact that they are already high school graduates, the overwhelming opinion that *The Watcher* does not present any serious challenges and that it is doubtful anyone could lose cannot be ignored. In its current state, the design fails to offer enough opportunities for task creativity, part of the foundation of problem solving. As a remedy, more issues, such as limited ammunition supplies, a more aggressive Russian force, or limited range of sight could be introduced to make the battle more varied and intricate. This sort of development would be more effective if play-testing involving the target age group was included.

Another issue introduced by the testers' reactions was the current level of expectation for today's computer simulations. During the time *The Watcher* was in development, many breakthroughs occurred which affected the amount of realism games can now present. Three-dimensional drivers, in both software and hardware form, now allow developers to create three-dimensional worlds which enable characters to walk around freely and explore their environment. It is now standard to render the objects and images for games three-dimensionally so that they can be moved or used in a more realistic fashion. Comments such as "the characters' mouths should move when they talk," "I wanted to be able to walk around the camp," and "The graphics looked too cartoonish" are evidence that the impact of these advancements has already been assimilated. To even gain the attention of students in a few years it will be necessary to include such improved graphics and programming.

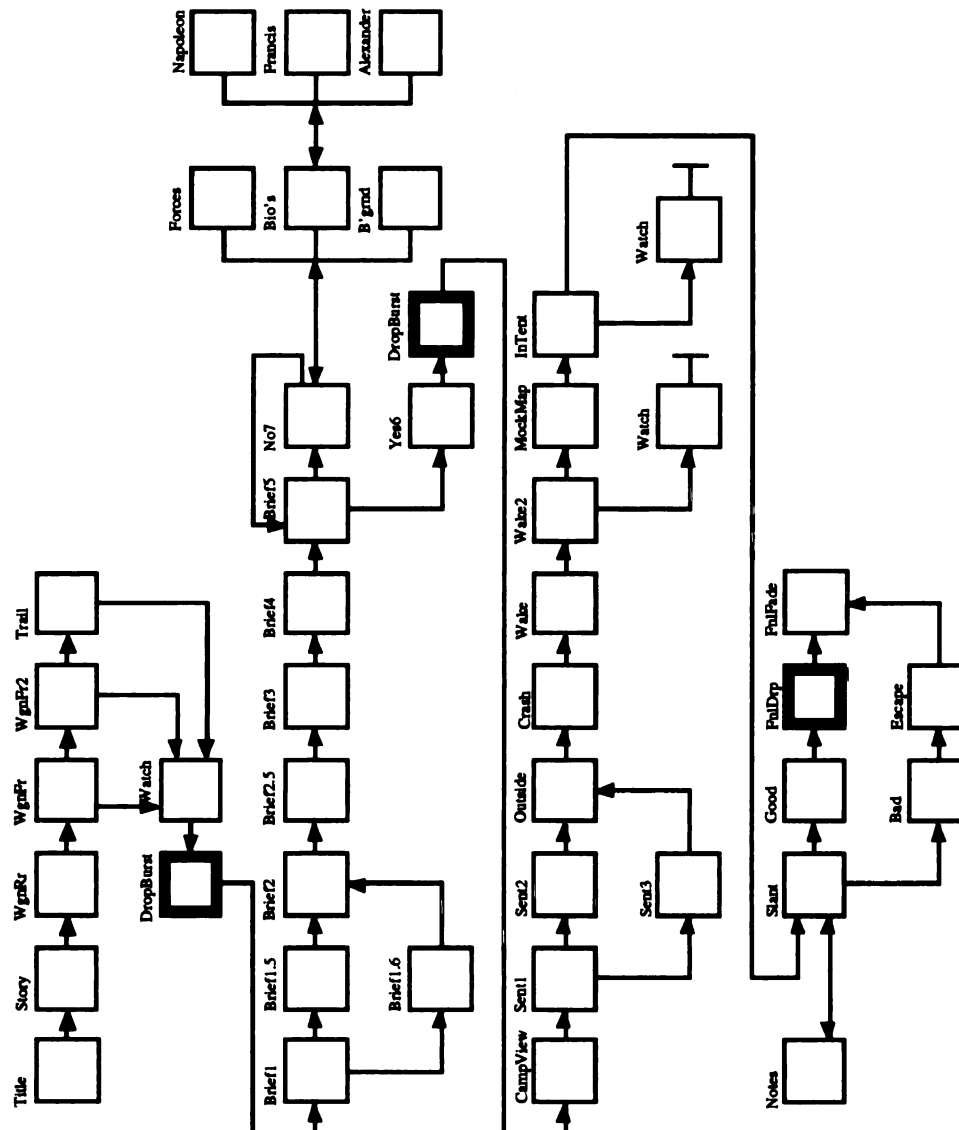
As stated, *The Watcher* is designed to capture the interest of the player, immerse that person in an encompassing narrative and provide the conditions necessary for the player to live a desired experience which includes learning through problem solving. Based on the opinions of a panel of experts, these elements, to varying degrees do exist in the design. Comments such as “It’s a fun way of learning” and “It uses the medium of entertainment while jokes into facts” show that the design concept is successful. The strength of this success is not quantifiable within the limits of this study, but a simple post-adventure exam designed to reveal how many of the desired facts and concepts were integrated into the students’ experiences could form the basis of further study.

APPENDICES

APPENDIX A

APPENDIX A

Figure A: Narrative Diagram of *The Watcher*



APPENDIX B

APPENDIX B

Structure View of *The Watcher* from mTropolis

On the cutting edge of authoring software in mFactory's mTropolis. This software package differs from more traditional programming tools in that it is object-oriented rather than text-based. Instead of typing out volumes of programming code, a software developer merely drags certain preconfigured objects or behaviors for the objects into the workspace. Due to this new approach, there is no copy of the programming to include with this report. Instead, a hierarchical diagram, called the Structure View, has been included. This diagram includes all of the elements which make up the program known as *The Watcher*. The program itself is divided into sections, subsections, and scenes which are analogous to the acts and scenes of a play.

Below is a key to help decipher the symbols used in the Structure View:



This is a section icon. There is only one section used in *The Watcher*.



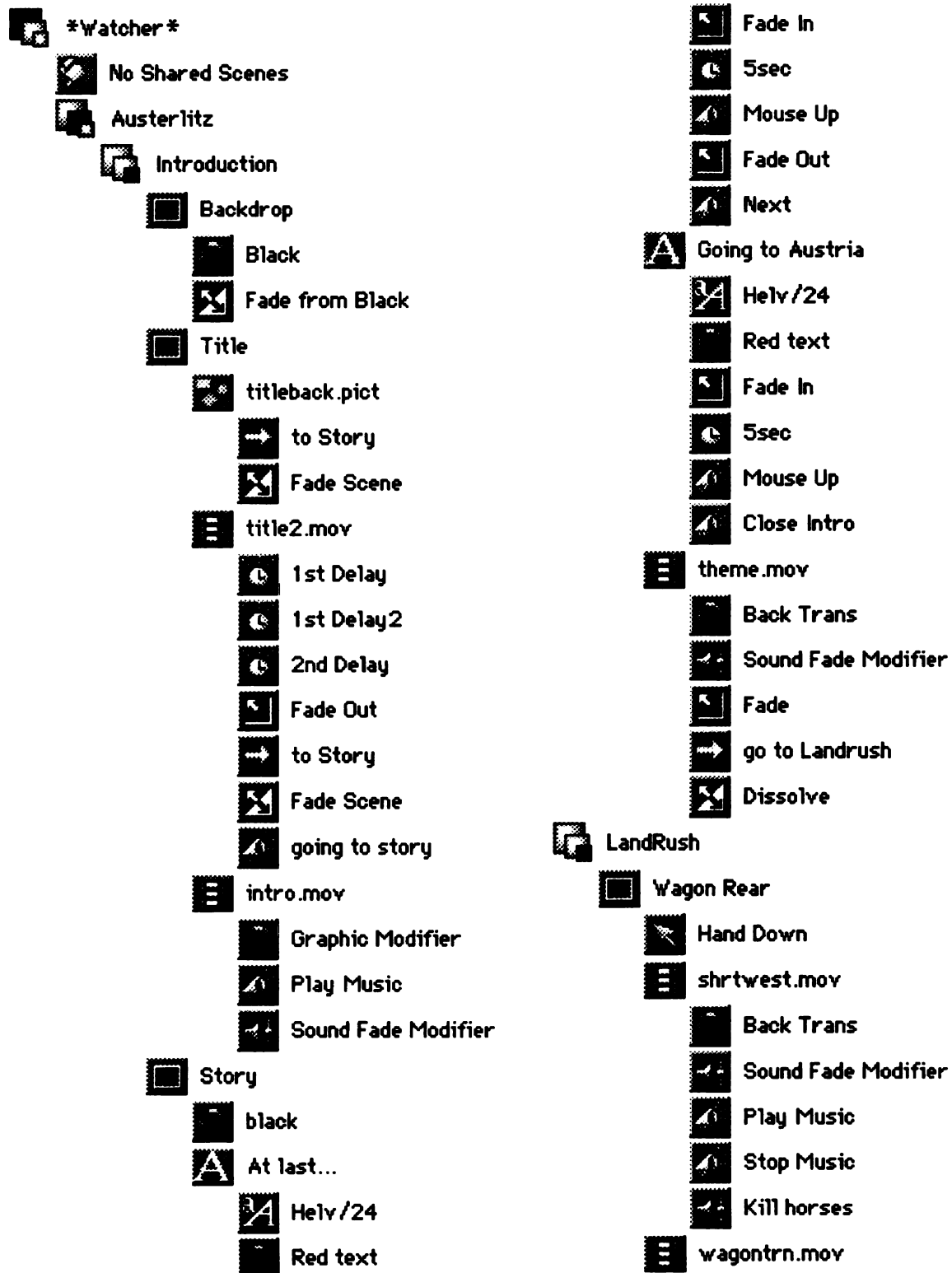
This is a subsection icon. These are the major story divisions.

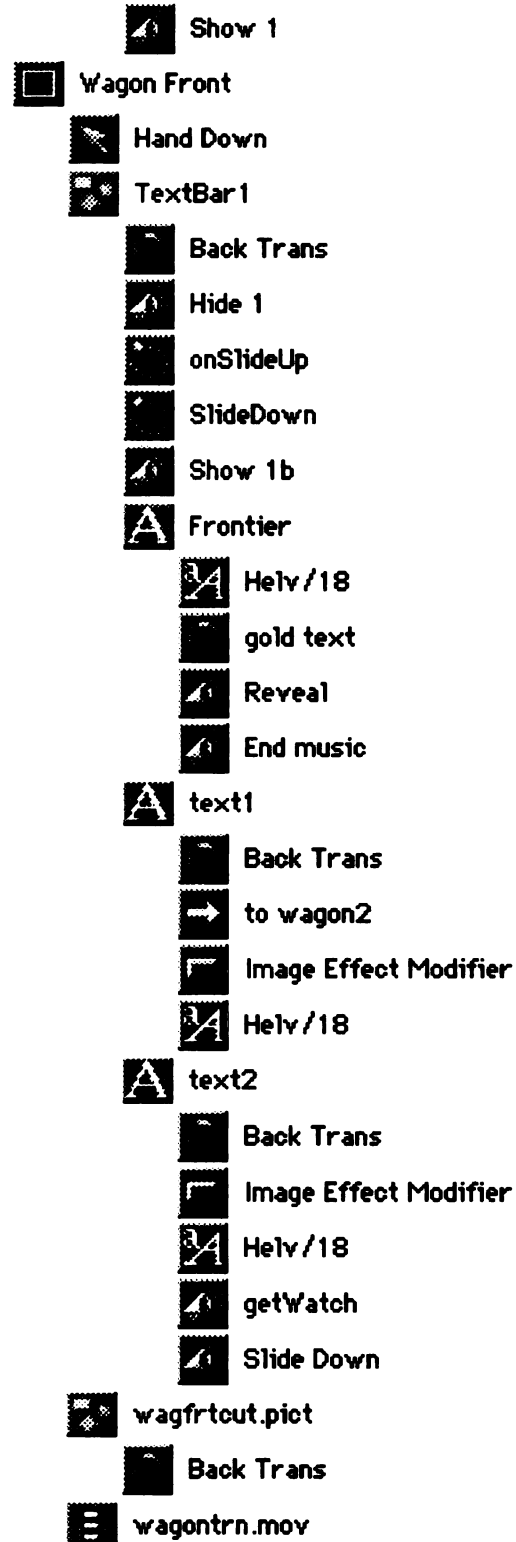
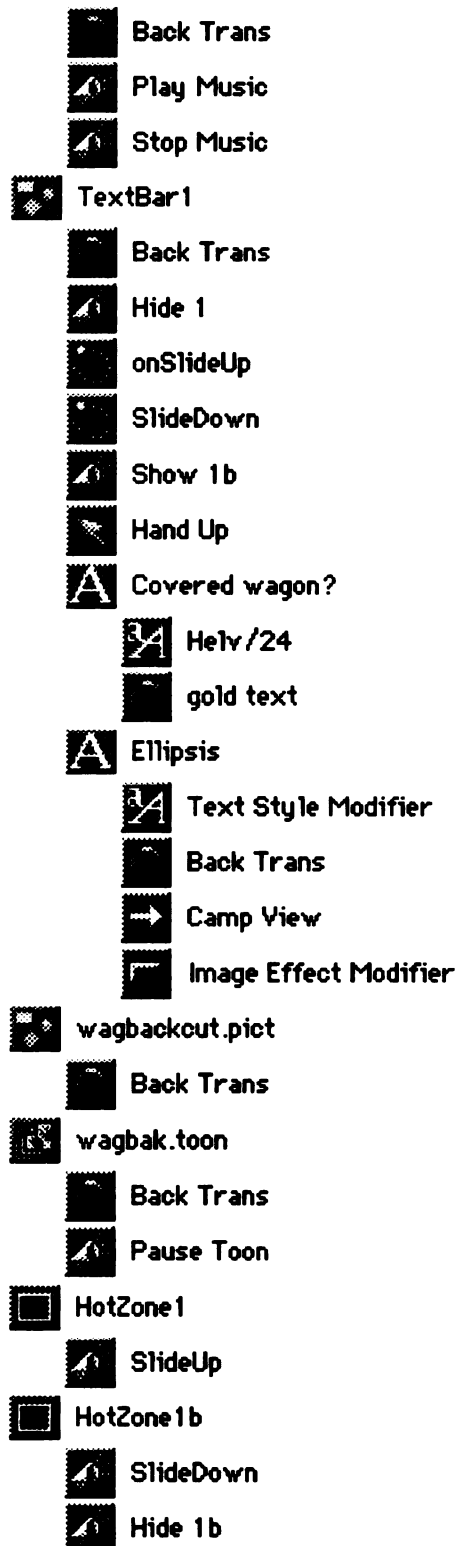


This is a scene icon. These contain all the element and behavior icons.

APPENDIX B

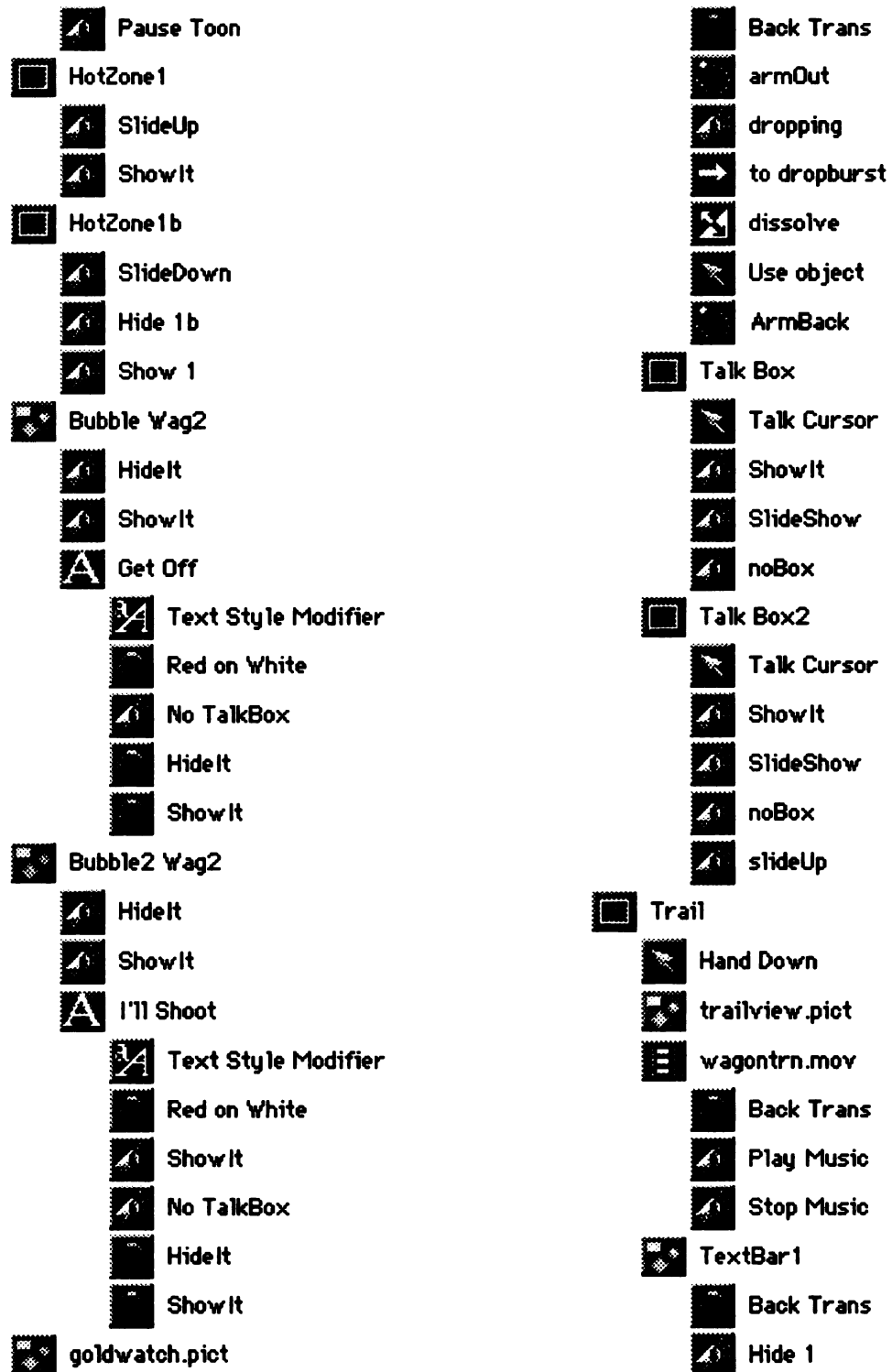
Structure View from mTropolis

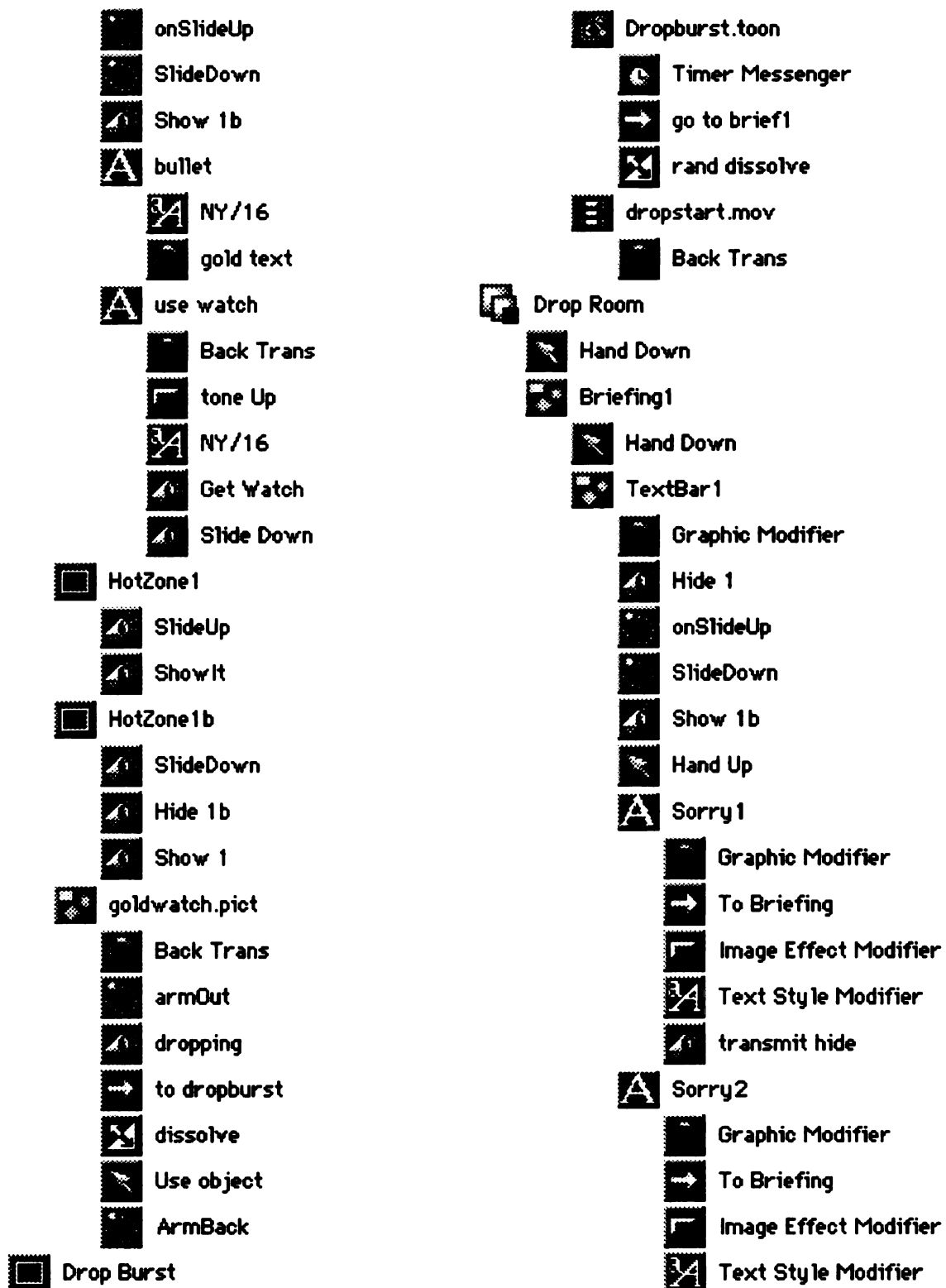




 Back Trans
 Play Music
 Stop Music
 manpa.toon
 Back Trans
 Pause Toon
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 Pause Toon
 HotZone1
 SlideUp
 HotZone1b
 SlideDown
 Hide 1b
 Show 1
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 Use object
 ArmBack
 Wagon Front2
 Hand Down
 TextBar1
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 SlideDown
 Show 1b
 Get off now
 NY/18
 gold text
 Reveal
 End music
 watch
 Back Trans
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 NY/16
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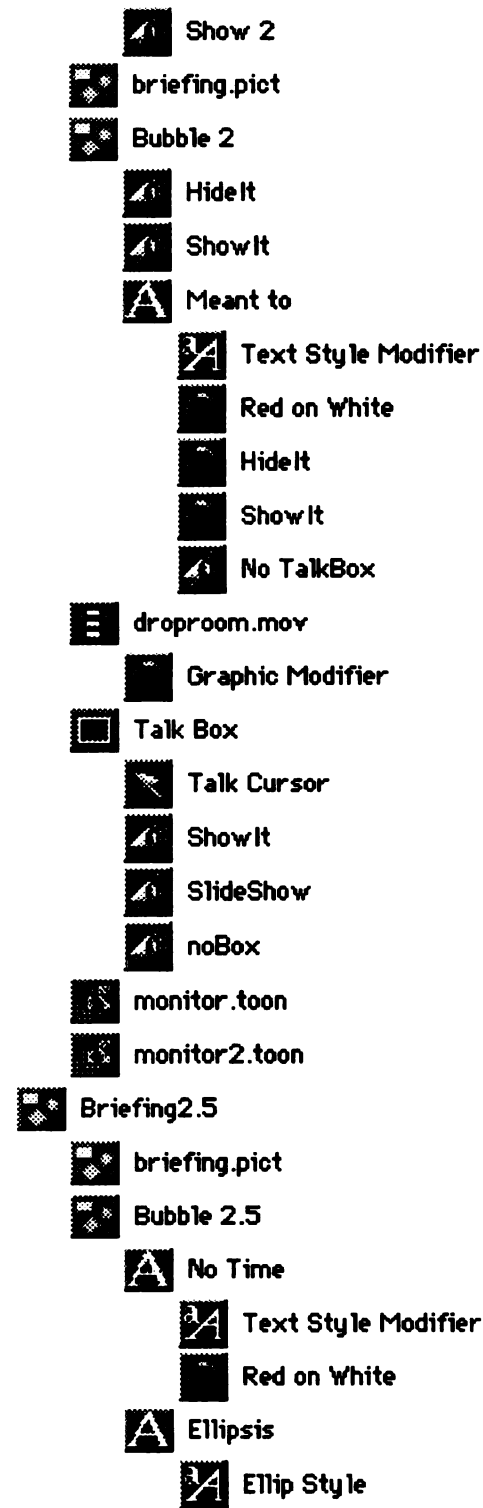
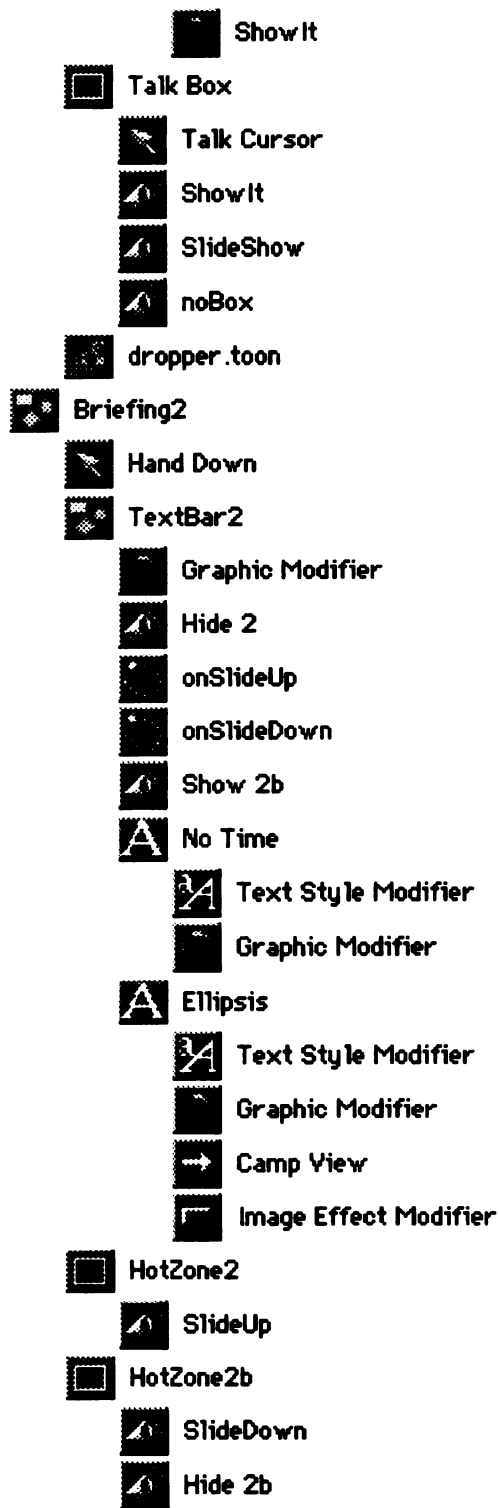


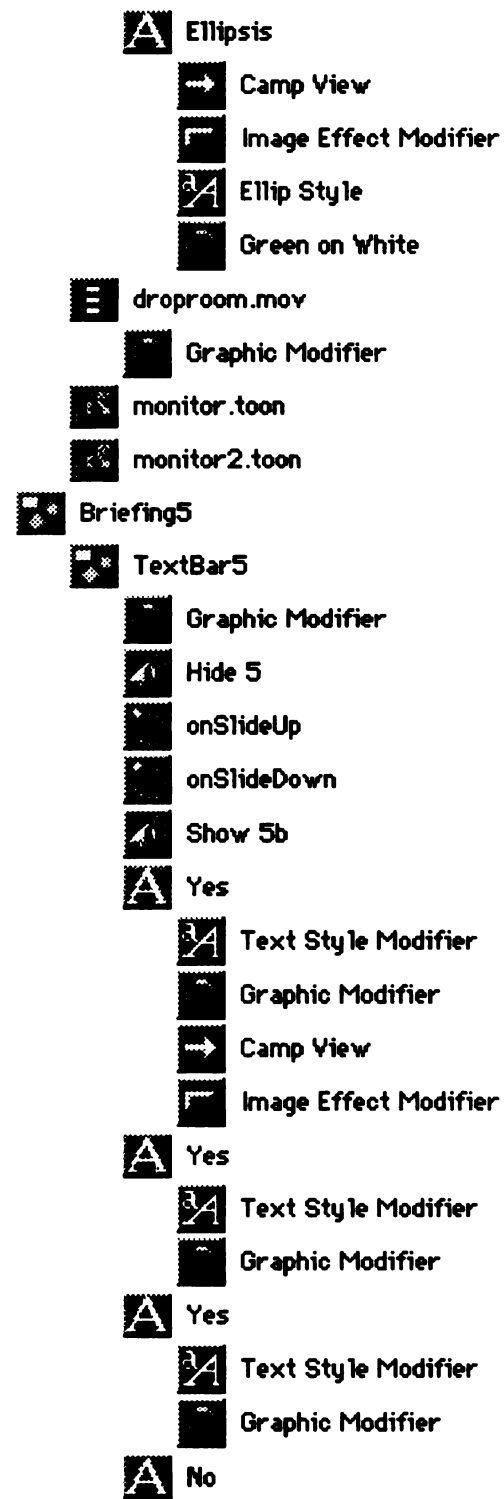
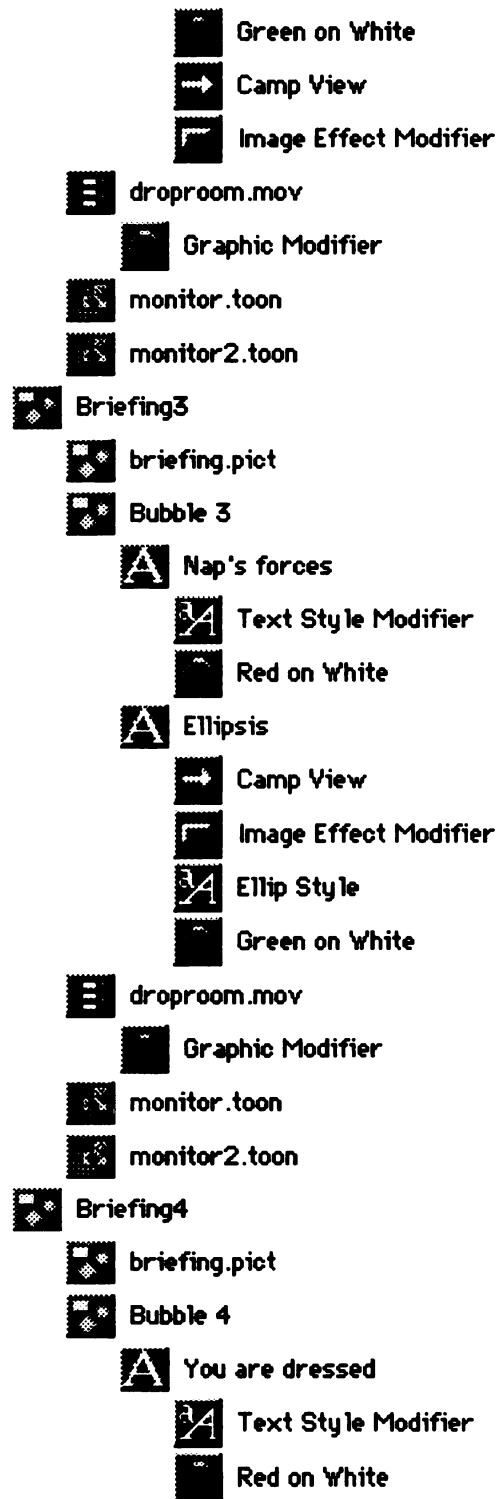


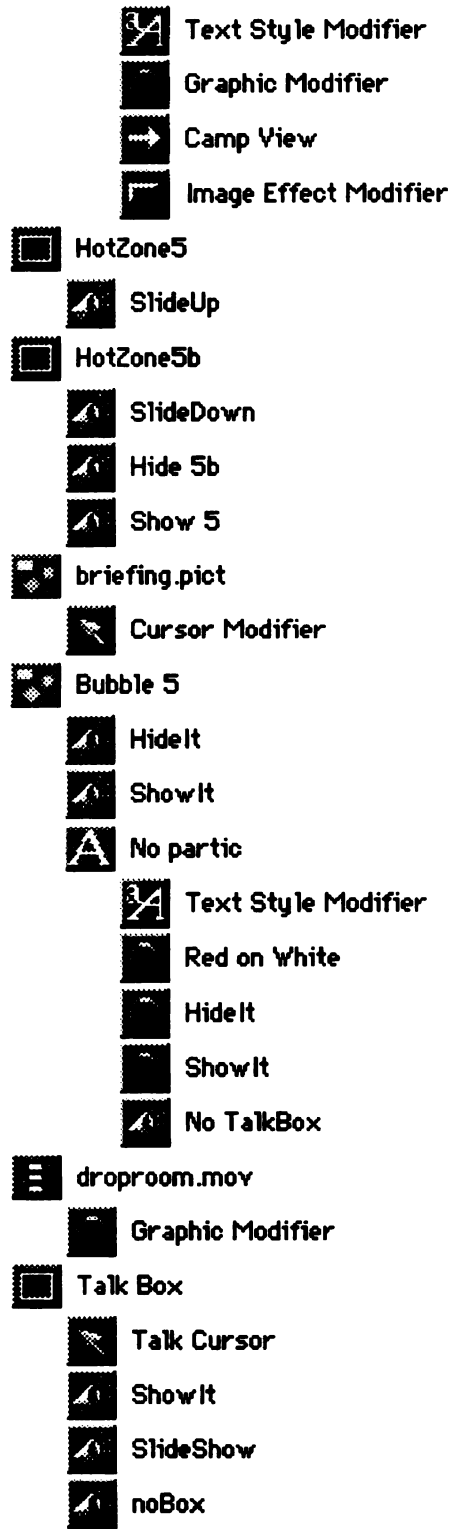
- transmit hide
- Bullets
 - Graphic Modifier
 - Text Style Modifier
- HotZone1
 - SlideUp
- HotZone1b
 - SlideDown
 - Hide 1b
 - Show 1
- droproom.mov
 - Graphic Modifier
- backpanels
 - Stop Toon
- backpanels
 - Stop Toon
- Bubble 1
 - HideIt
 - ShowIt
- No Time
 - Text Style Modifier
 - Red on White
 - No TalkBox
 - HideIt
 - ShowIt
- Talk Box
 - Talk Cursor
 - ShowIt

- SlideShow
- noBox
- dropper.toon
- Briefing1.5
 - Hand Down
 - TextBar1
 - Graphic Modifier
 - Hide 1
 - onSlideUp
 - SlideDown
 - Show 1b
 - Where Been
 - Text Style Modifier
 - Graphic Modifier
 - Sorry1
 - Graphic Modifier
 - To Briefing
 - Image Effect Modifier
 - Text Style Modifier
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 - Graphic Modifier
- entry.pict

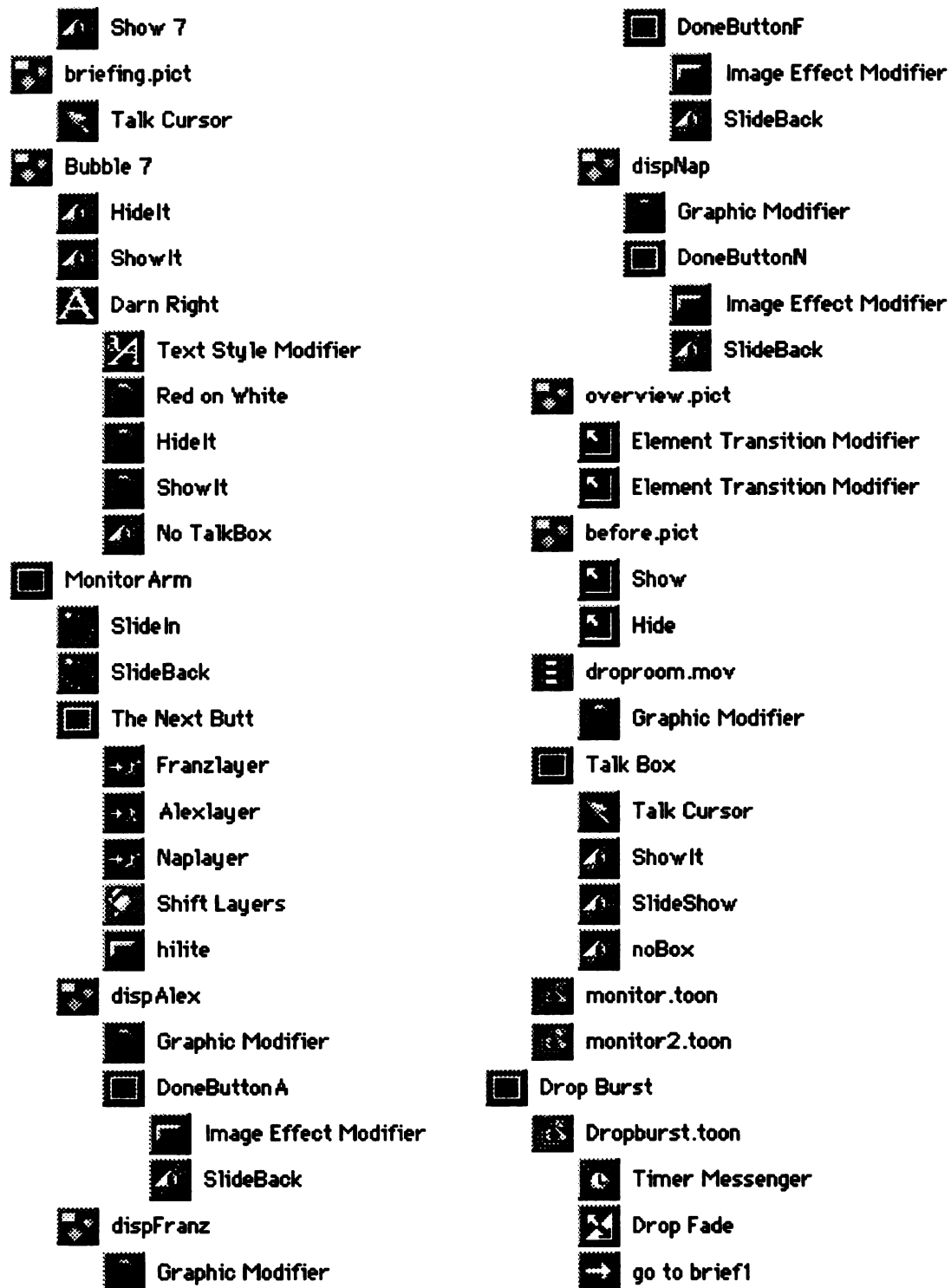


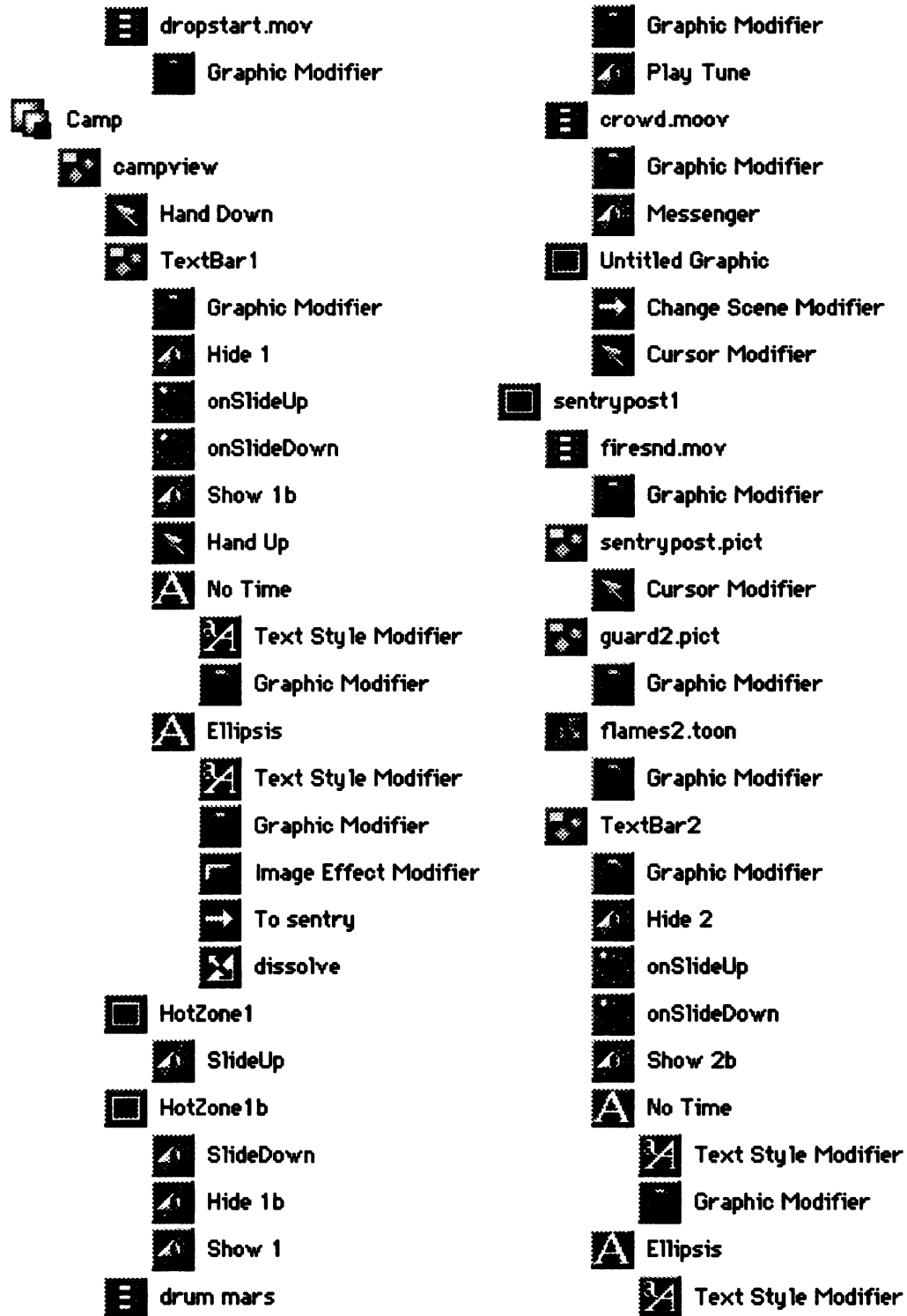


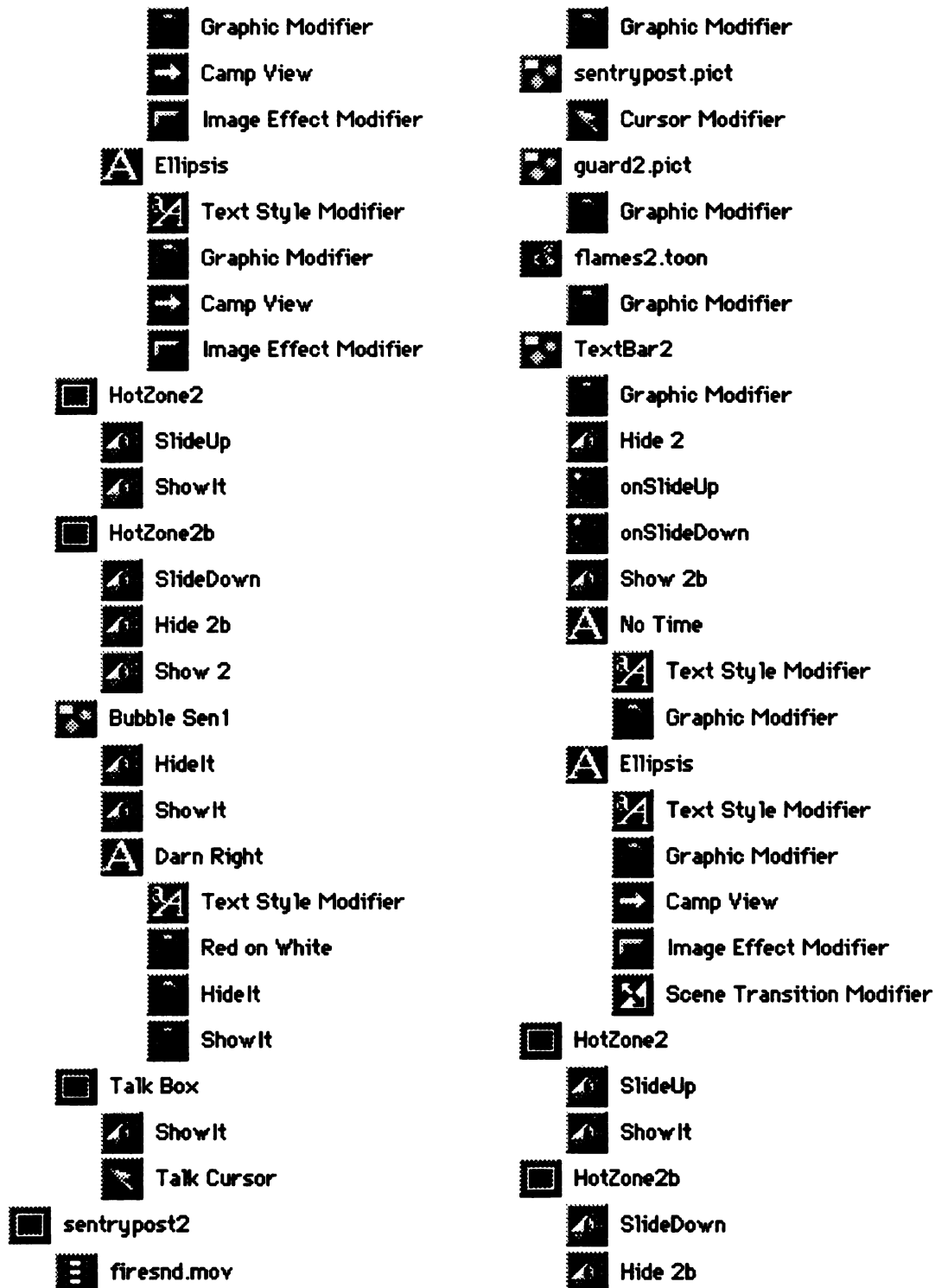


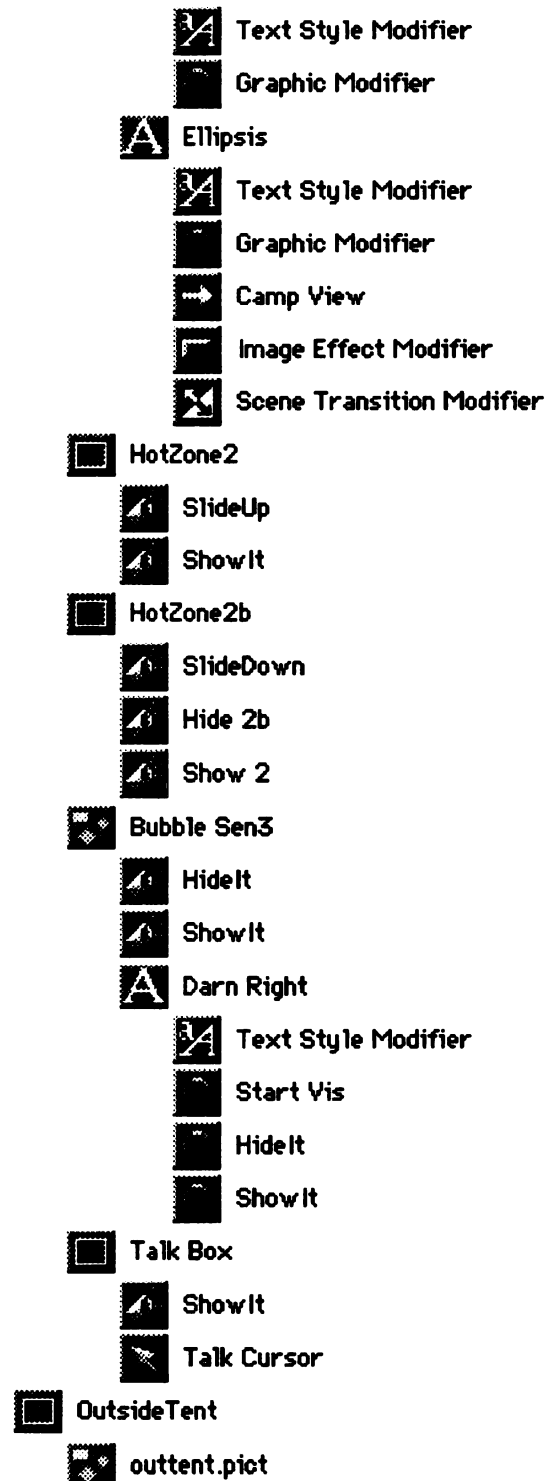
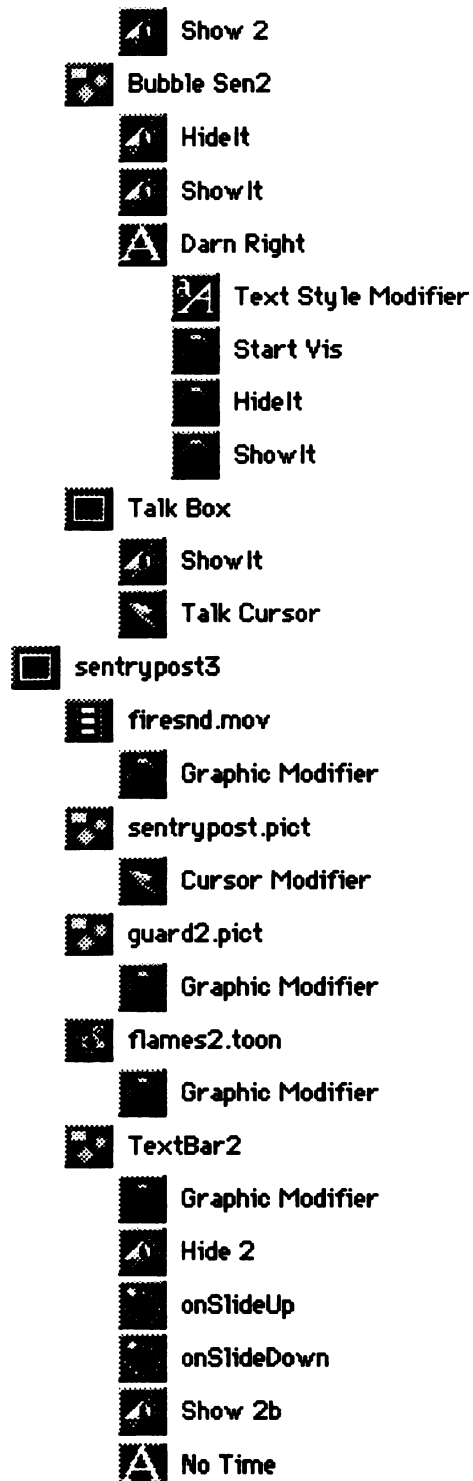


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	HideIt		Graphic Modifier
	ShowIt		Forces
	Good Luck		Text Style Modifier
	Text Style Modifier		Graphic Modifier
	Red on White		Image Effect Modifier
	HideIt		Forces
	ShowIt		Bios
	No TalkBox		Graphic Modifier
	droproom.mov		Image Effect Modifier
	Graphic Modifier		Text Style Modifier
	launchON		Messenger
	abortON		slideDown
	Talk Box		Background
	Talk Cursor		Graphic Modifier
	ShowIt		Image Effect Modifier
	SlideShow		Text Style Modifier
	noBox		O-view
	monitor.toon		Done
	monitor2.toon		Graphic Modifier
	Said NO (7)		Image Effect Modifier
	TextBar7		Text Style Modifier
	Graphic Modifier		Camp View
	Hide7		HotZone7
	onSlideUp		SlideUp
	onSlideDown		HotZone7b
	Show7b		slideDown
	Bullets		Hide 7b



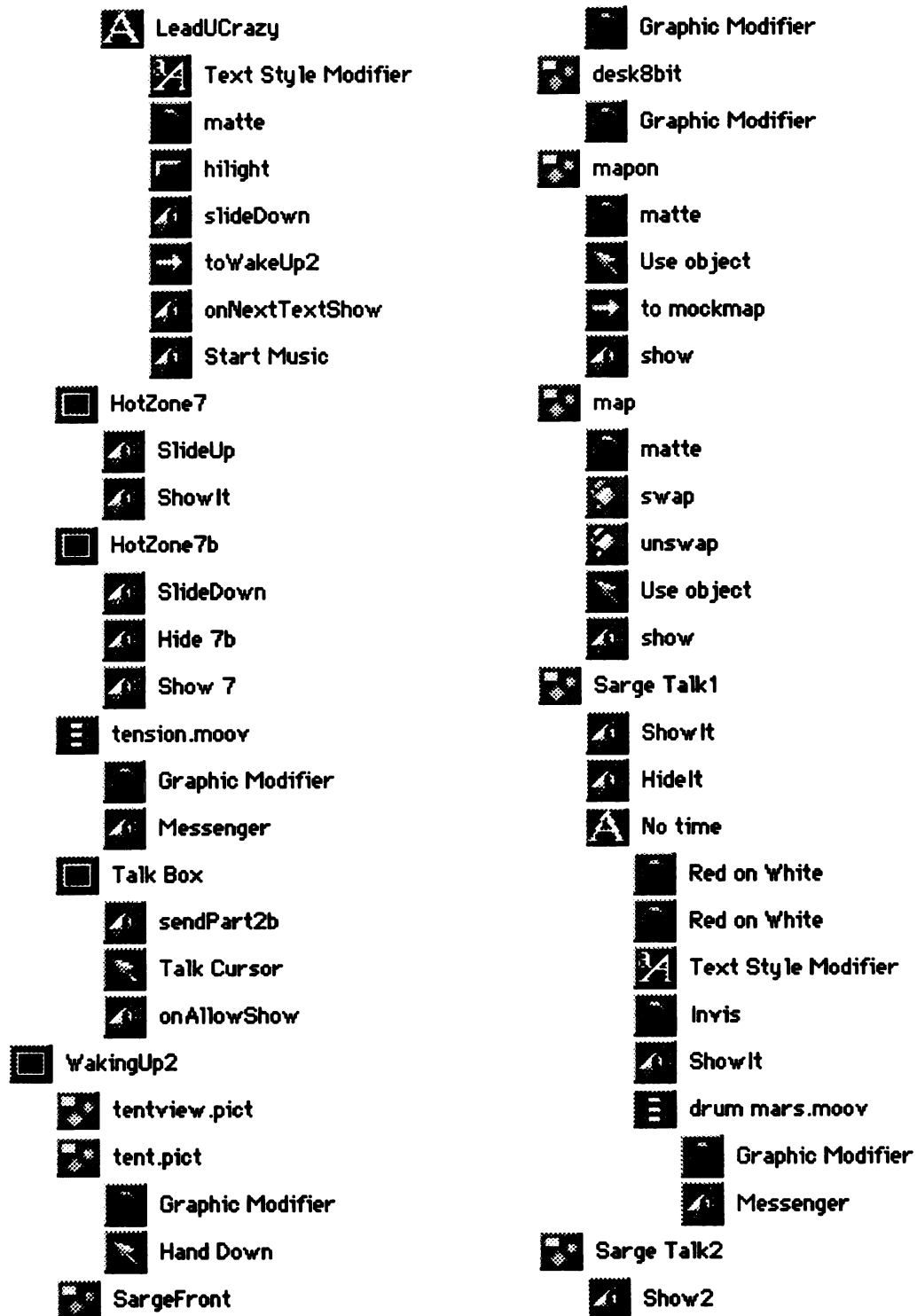






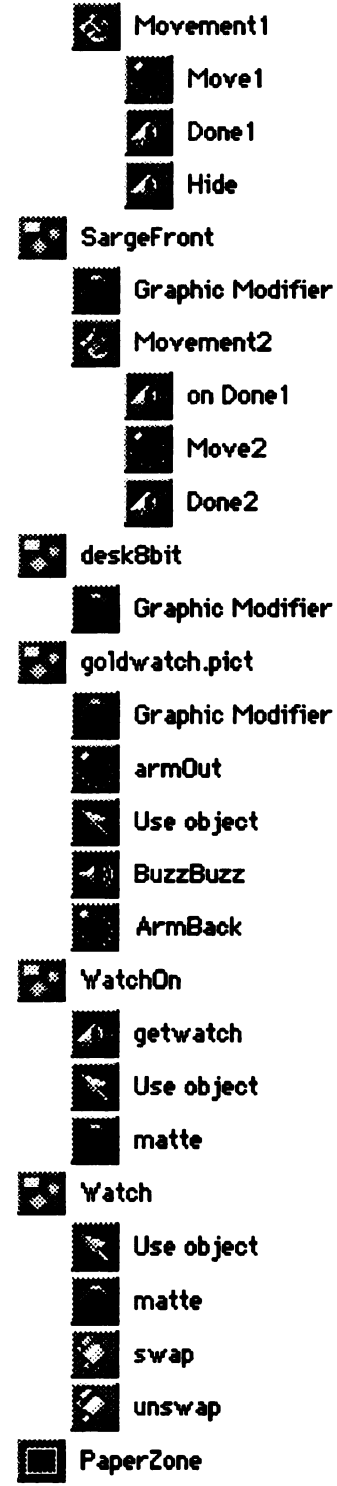
 Graphic Modifier
 Sarge Talk
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 How Help
 Red on White
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 Sarge Talk2a
 Show2a
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 Agreement
 Red on White
 Show2a
 Text Style Modifier
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 Sarge Talk2b
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 Your injury
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 Show2b
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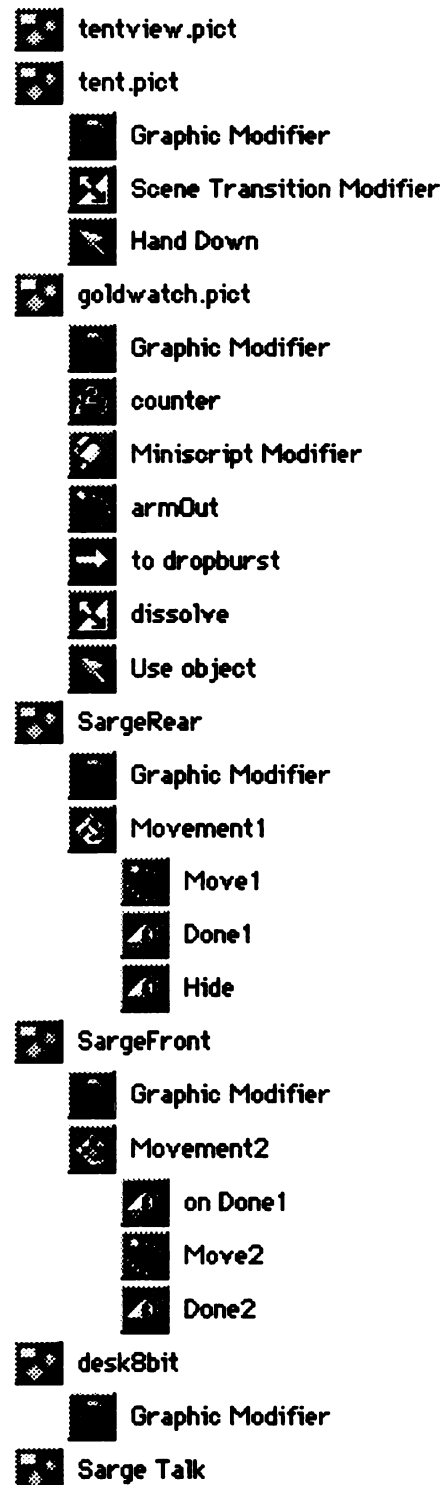
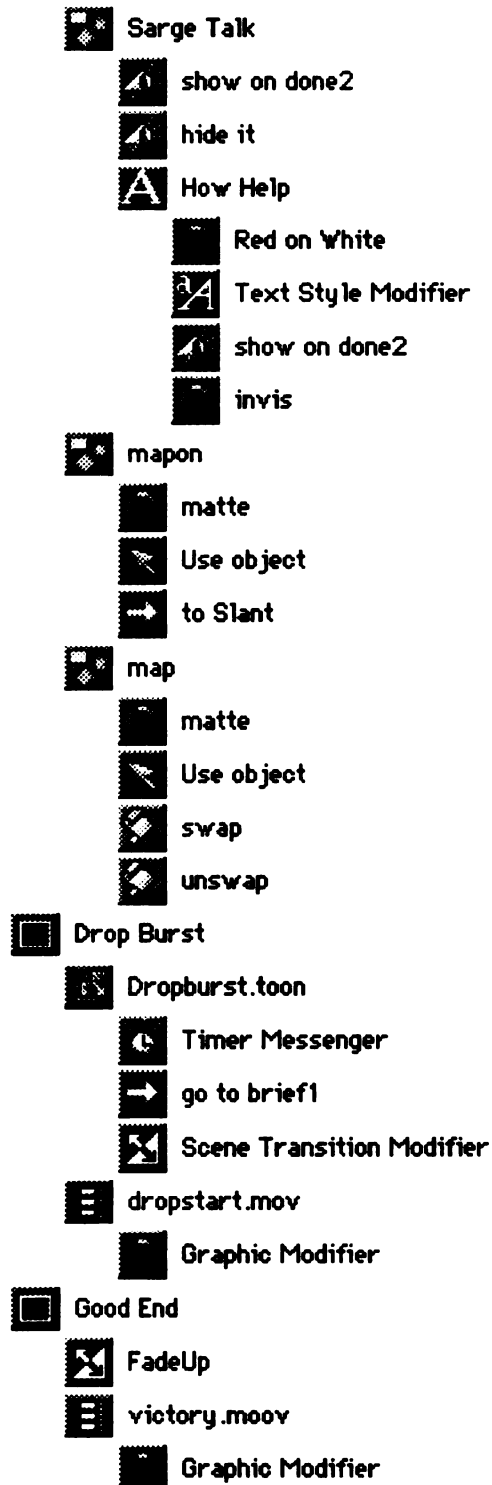
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 Show7b
 onSlideUp
 onSlideDown
 send allow
 Bullets
 Text Style Modifier
 matte
 nextTextHide
 Bullets2
 Text Style Modifier
 matte
 nextTextShow
 You are right
 Text Style Modifier
 matte
 hilight
 sendPart2a
 slideDown
 onNextTextHide
 What happened
 matte
 hilight
 Text Style Modifier
 sendPart2b
 slideDown
 onNextTextHide



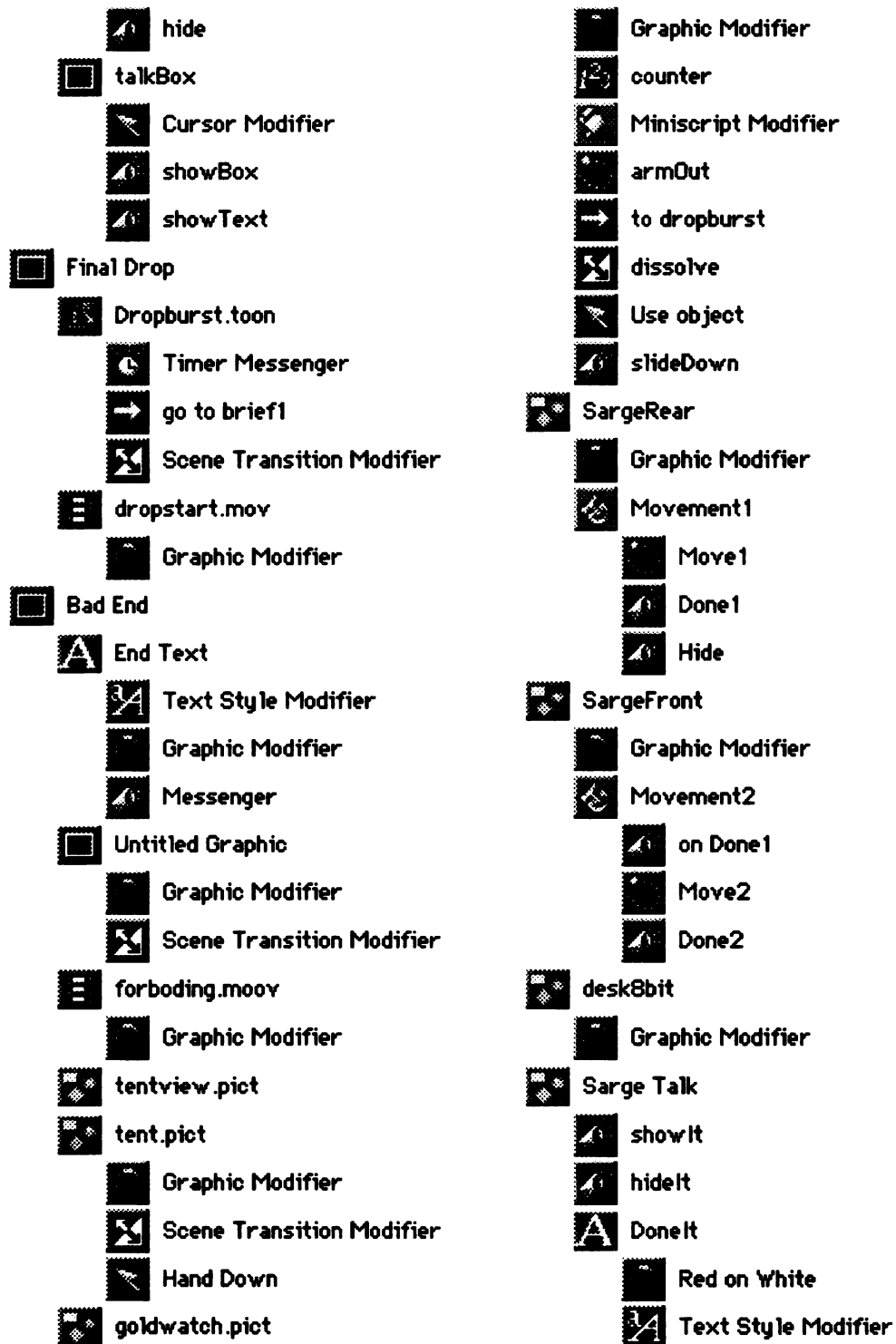
 Hidelt
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 Show2
 Text Style Modifier
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 TextBar
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 HideZone7
 onSlideUp
 onSlideDown
 ShowZone7b
 Bullets
 Text Style Modifier
 Red on White
 2ndTimeHide
 Bullets2
 Text Style Modifier
 Red on White
 Wrong history
 Text Style Modifier
 Green on White
 highlight
 Send Part2
 Hide7b
 SlideDown

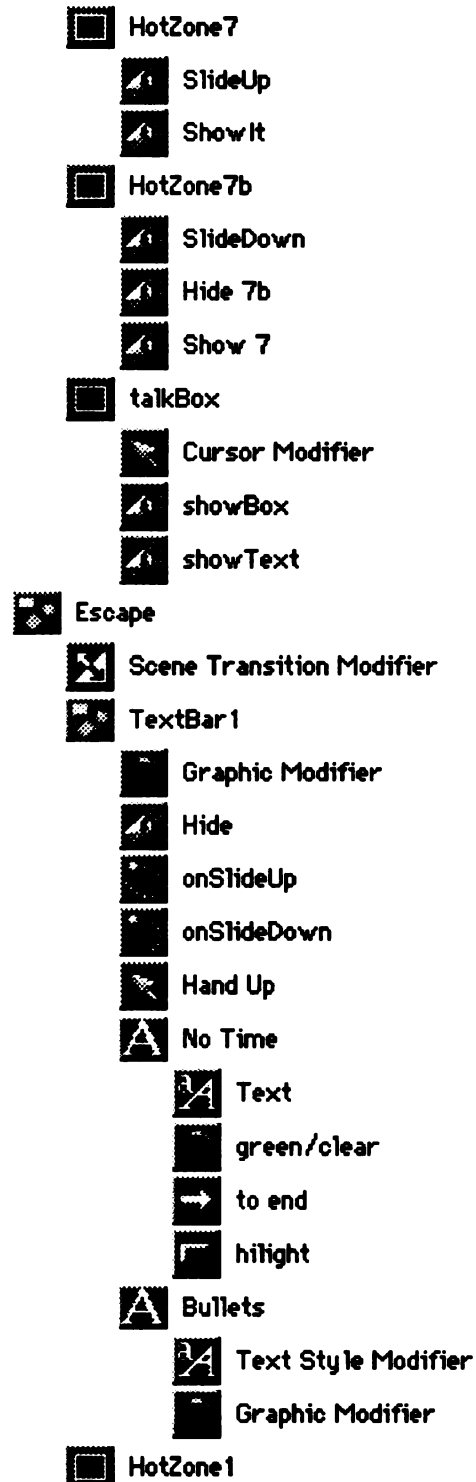
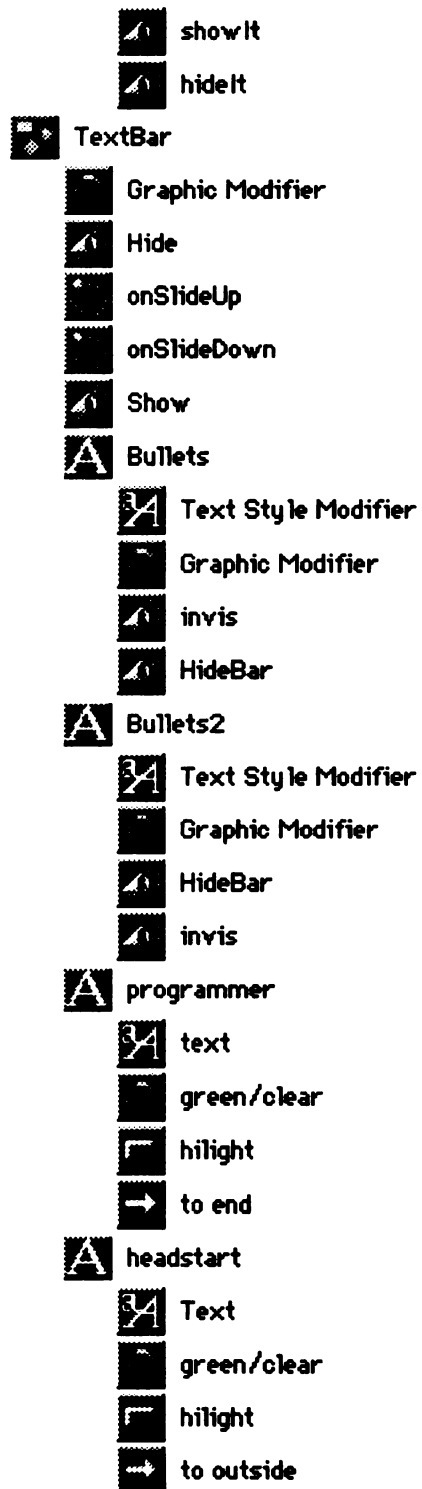
 Gone
 blinkOn
 don't interfere
 Green on white
 highlight
 Text Style Modifier
 getwatch
 hide7b
 slideDown
 2ndTimeHide
 TextBar2
 matte
 onSlideUp
 onSlideDown
 Bullets
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 ShowIt
 Messenger

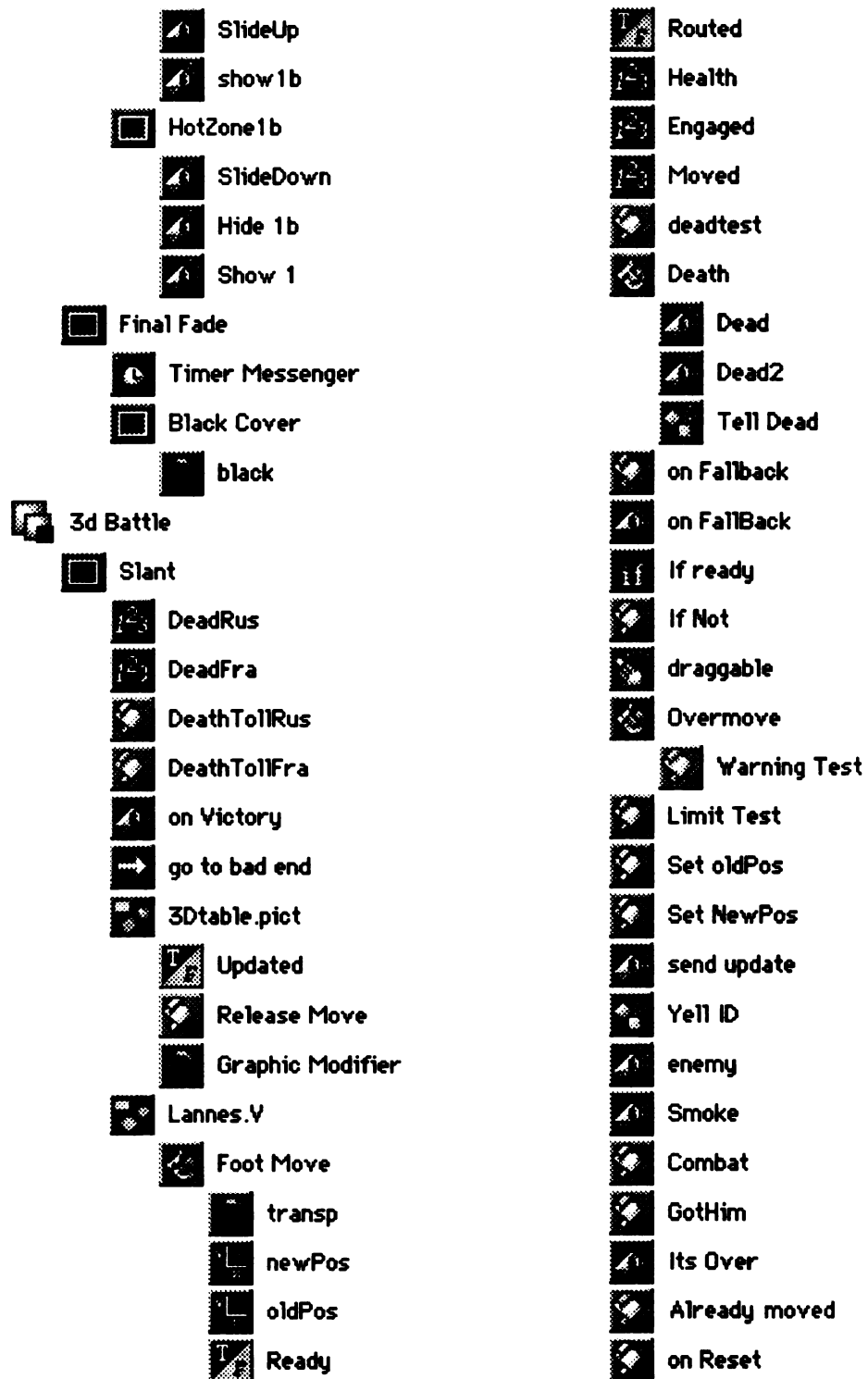


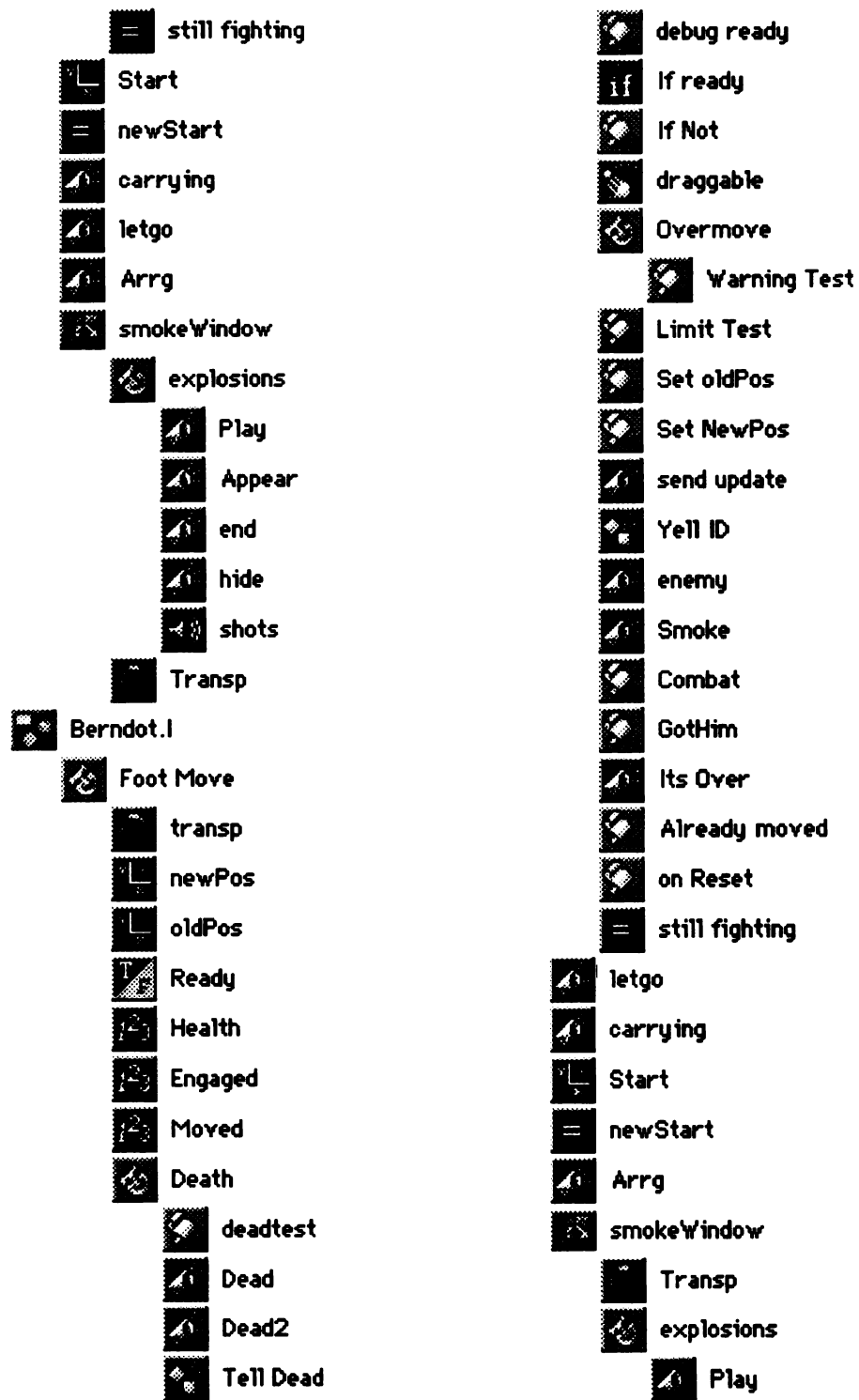


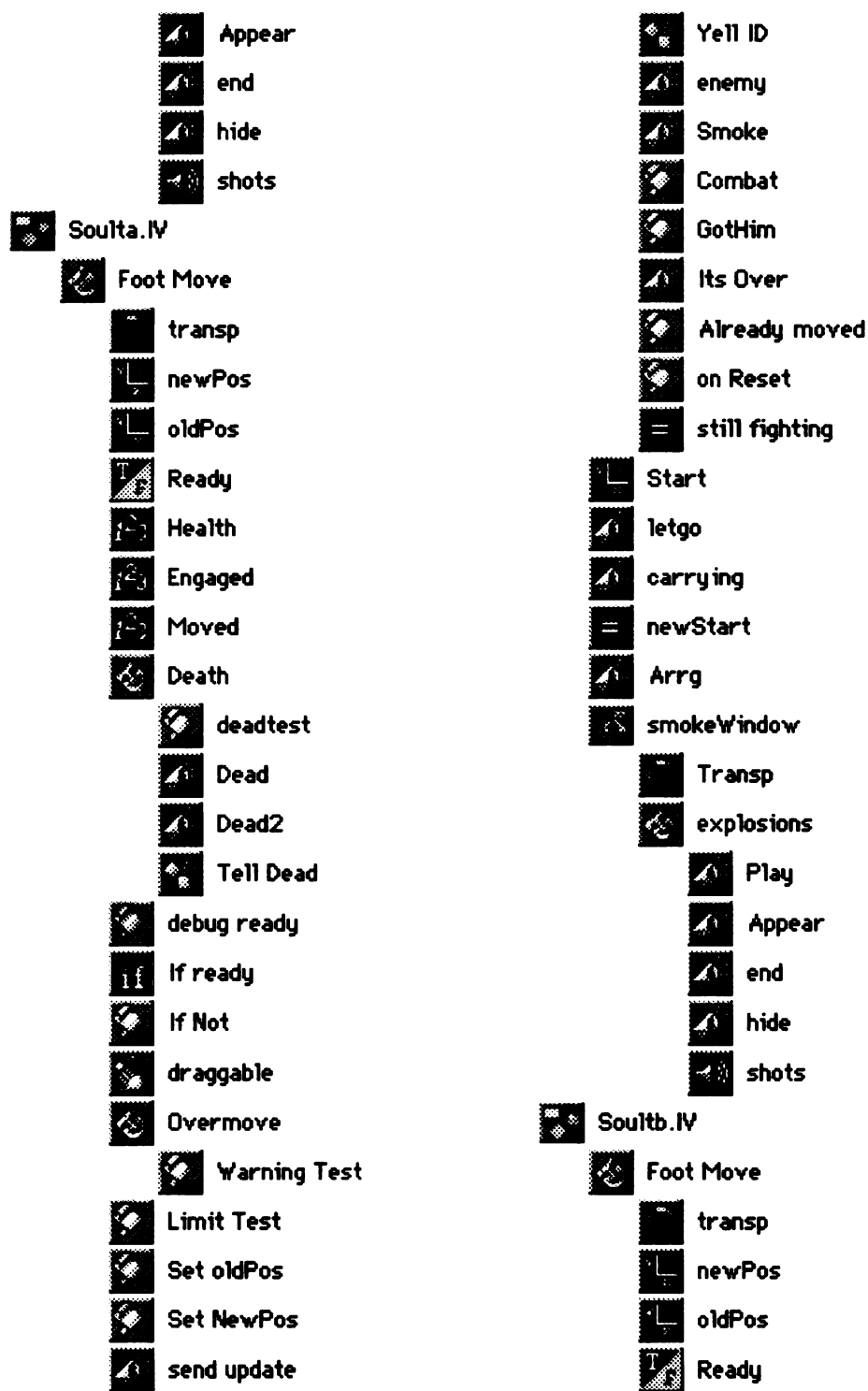


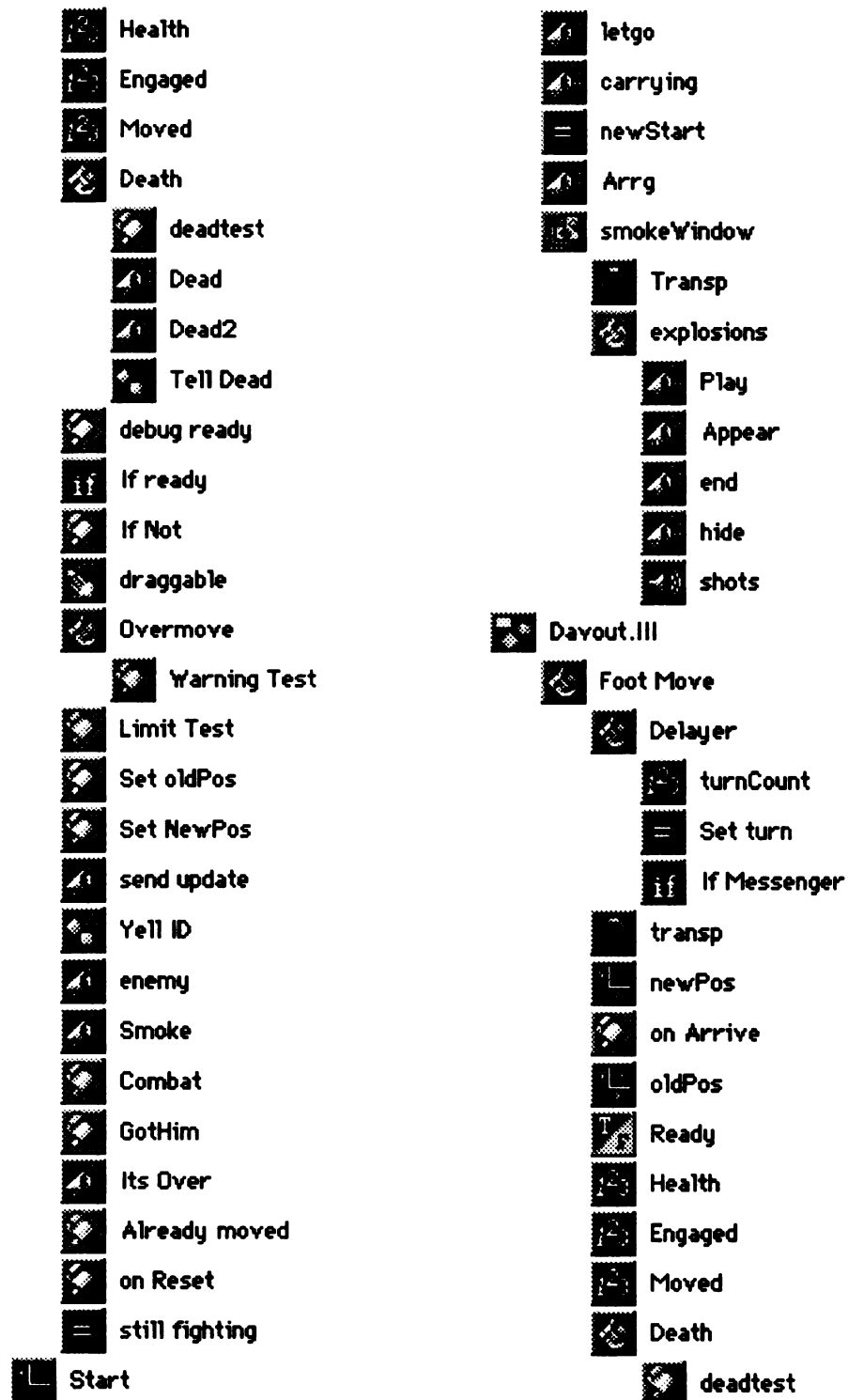


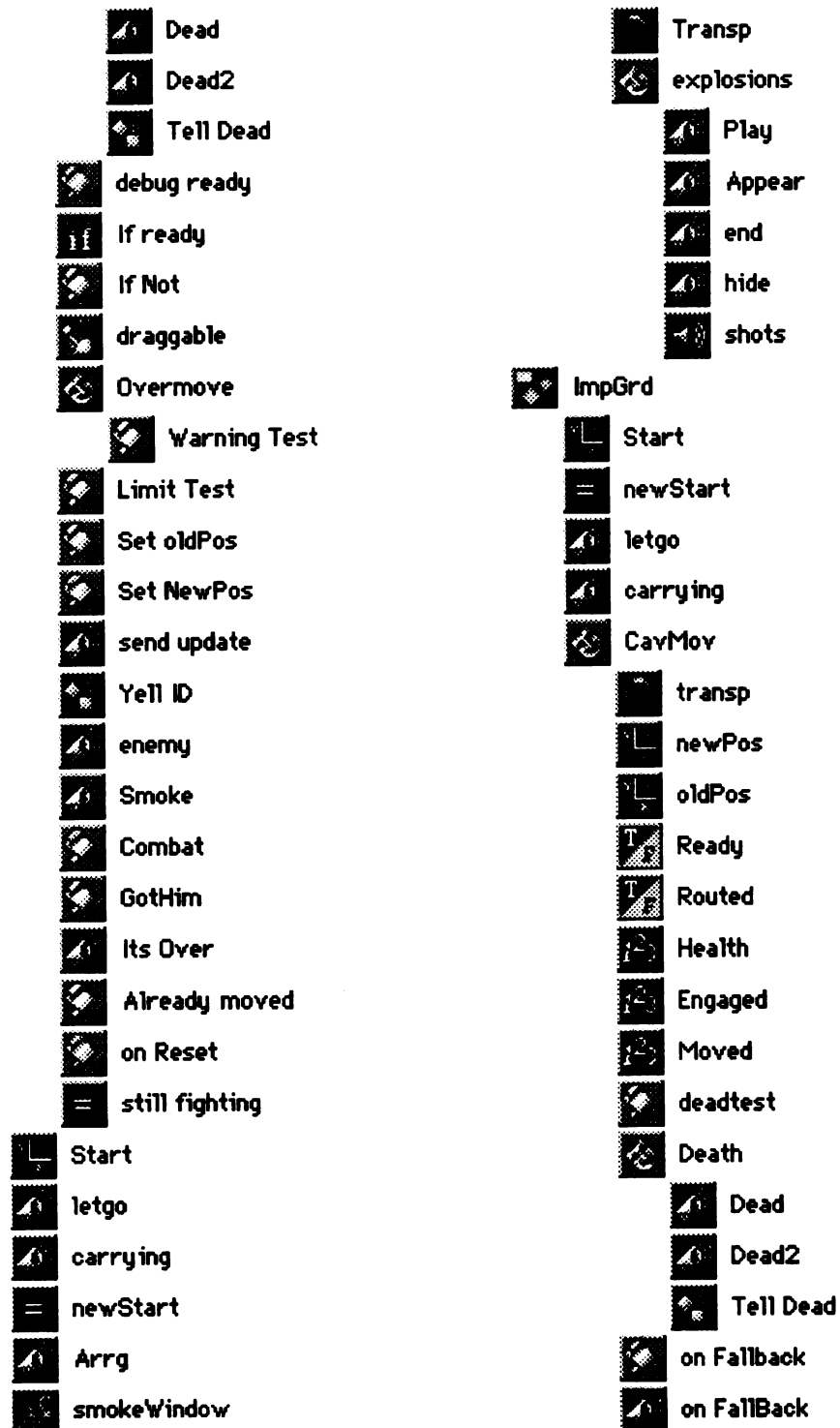




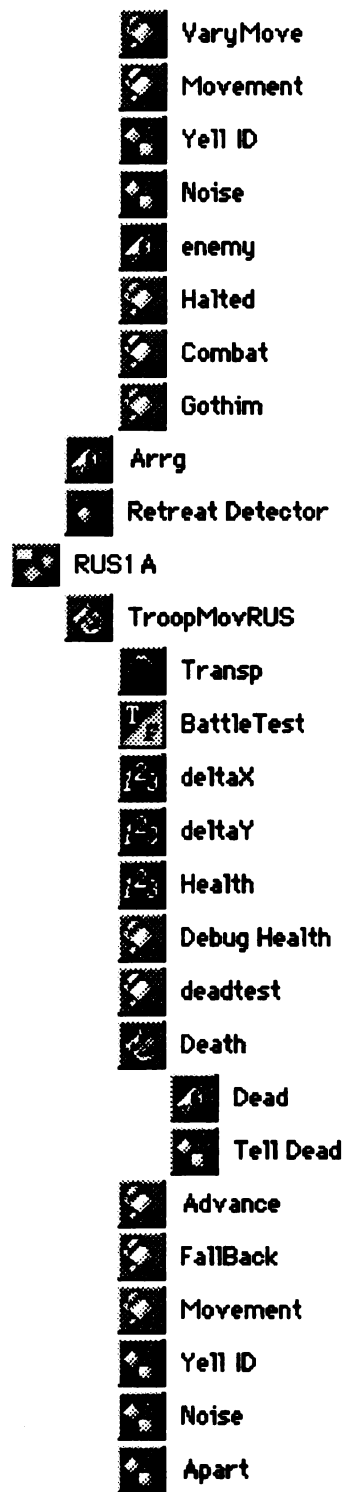


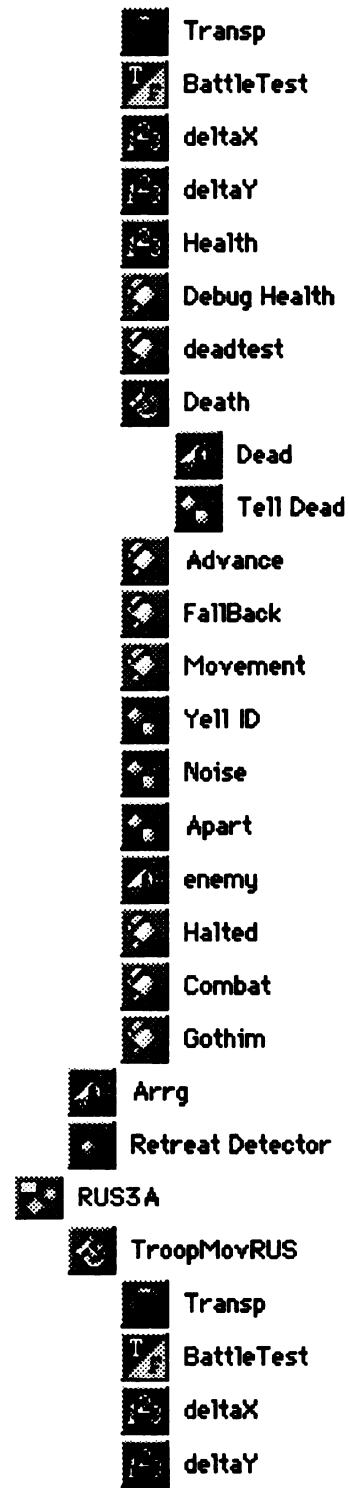


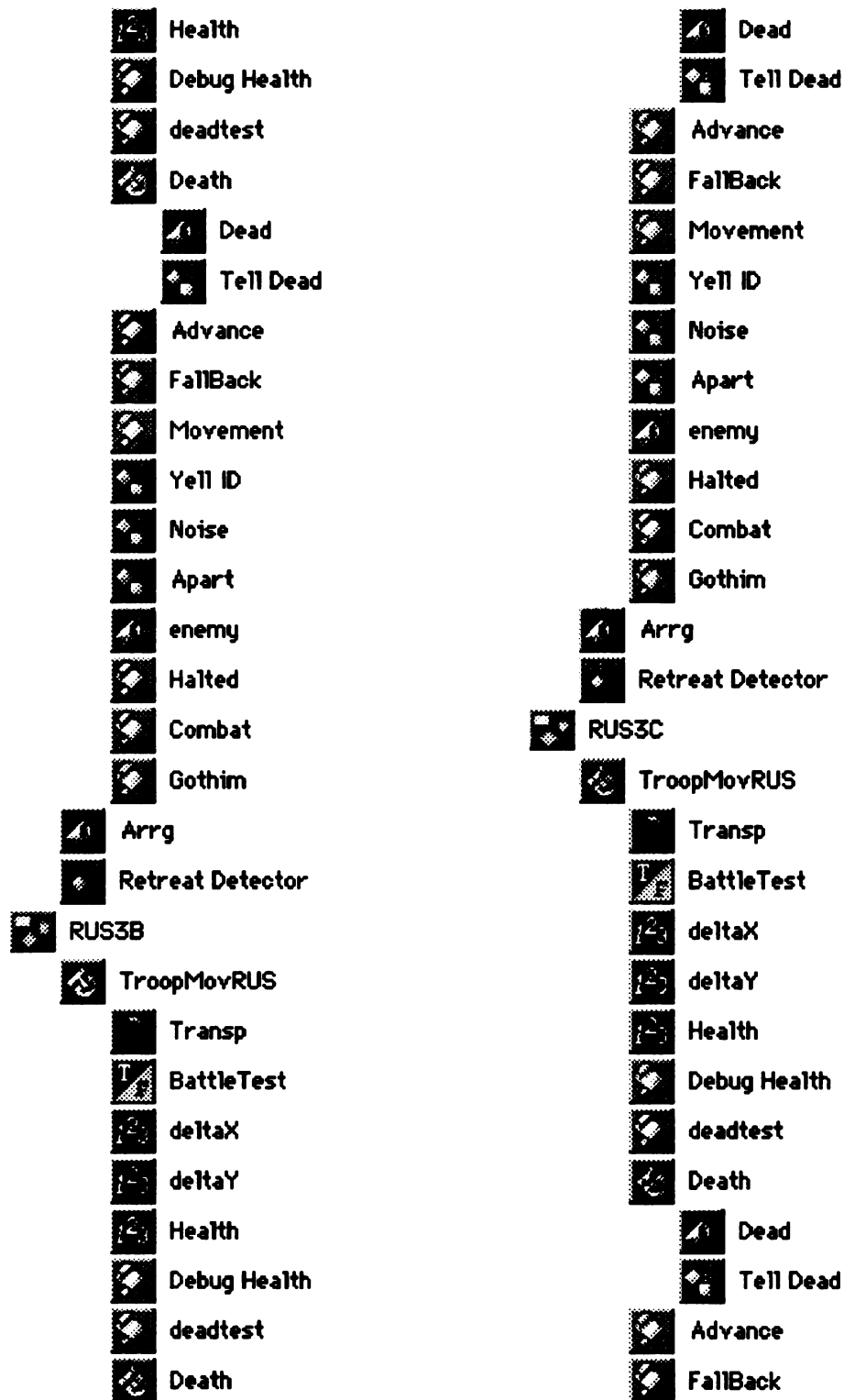






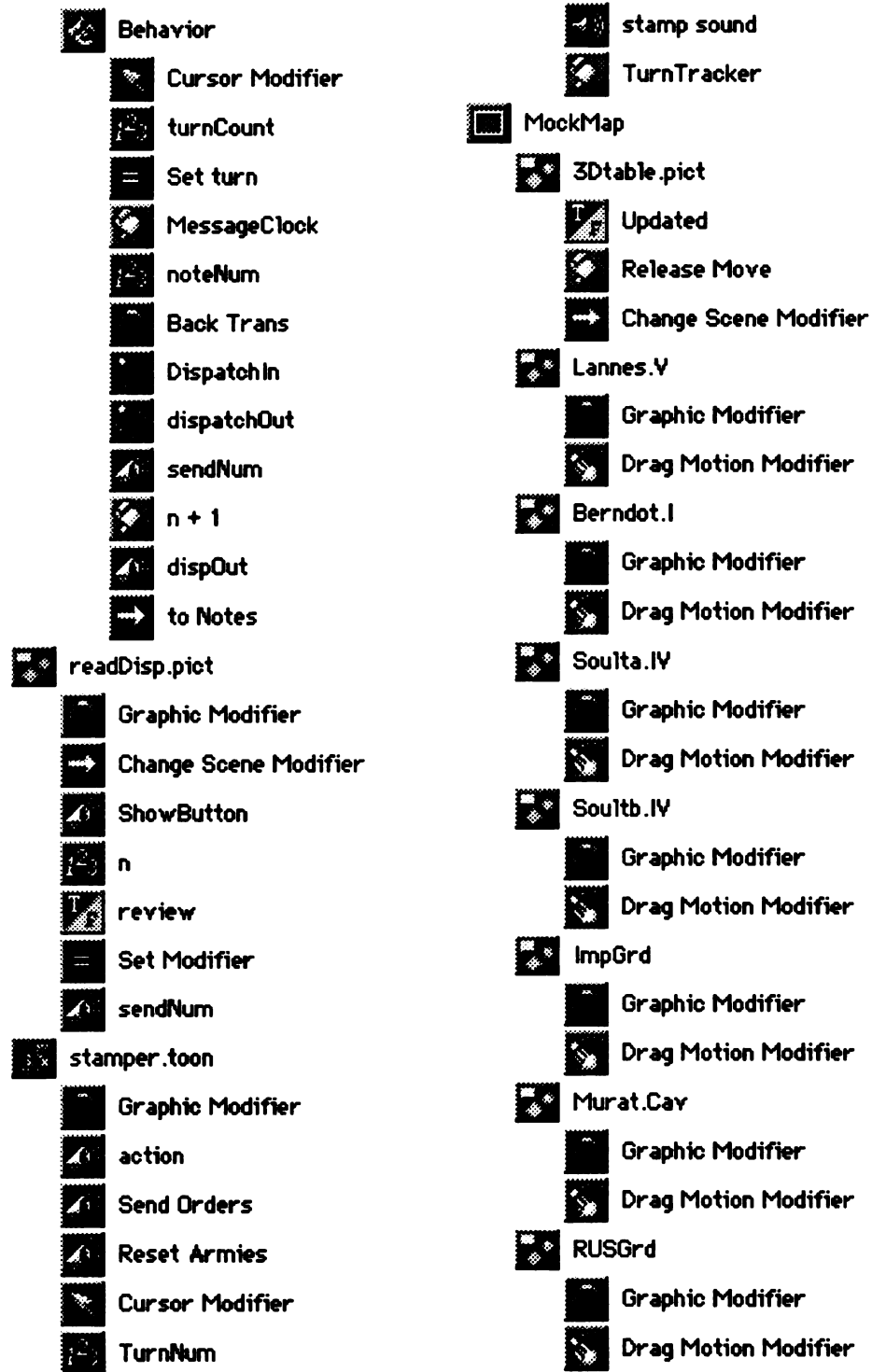


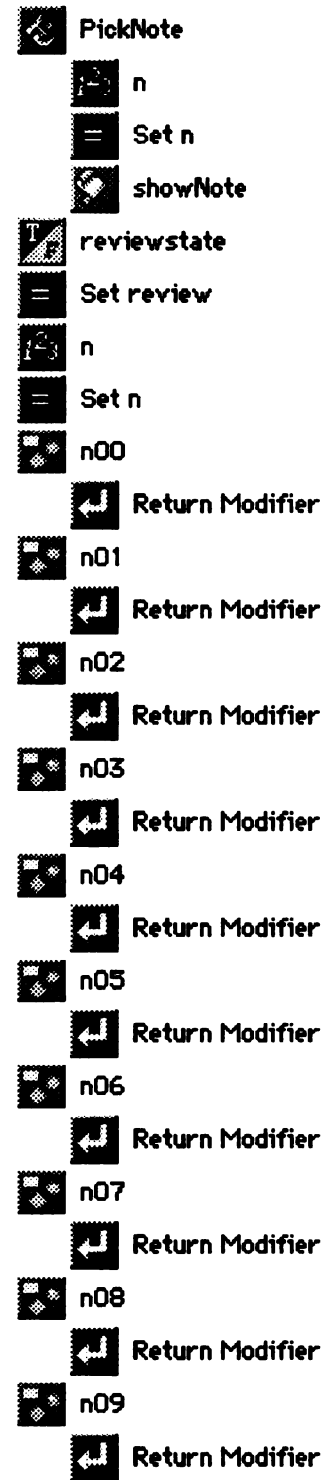
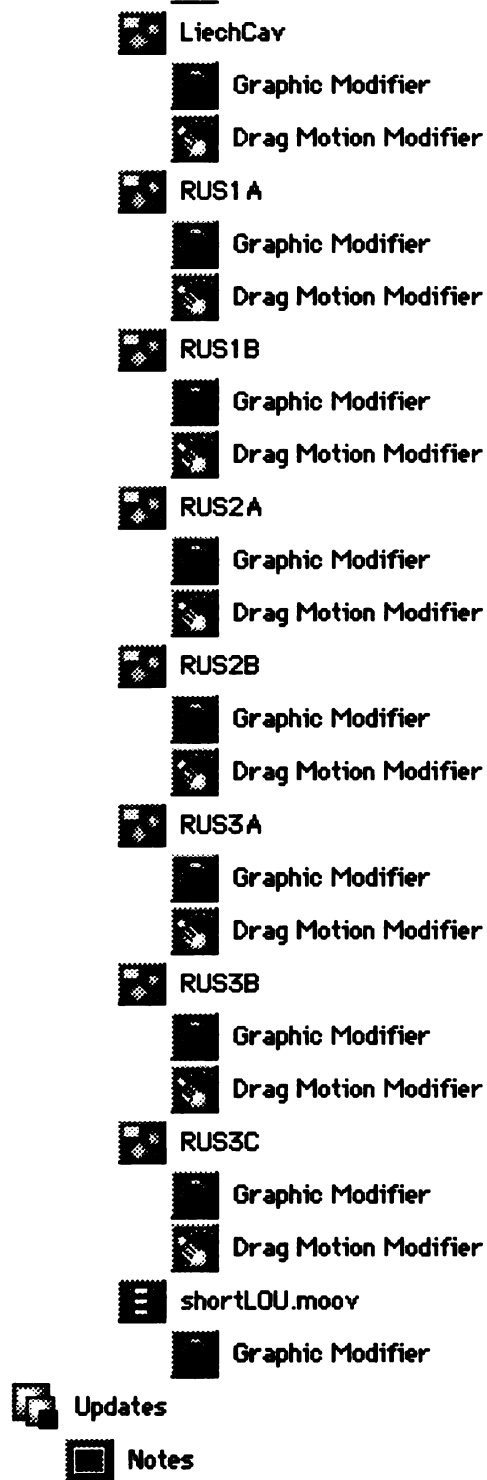




 Movement
 Yell ID
 Noise
 Apart
 enemy
 Halted
 Combat
 Gothim
 Arrg
 Retreat Detector
 sendOrders.pict
 Graphic Modifier
 sorry box
 noMore
 turn off
 If Messenger
 onGone
 noMore
 Show
 Sorry sir
 Text Style Modifier
 Red on White
 noMore
 turn off
 If Messenger
 onGone
 noMore
 Show

 OK
 Text Style Modifier
 Green on White
 Cursor Modifier
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 turn off
 If Messenger
 onGone
 Hide
 noMore
 Show
 OKstop
 sendNoWarning
 noMore
 turn off
 If Messenger
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 Hide
 Cursor Modifier
 Green on White
 Text Style Modifier
 noMore
 Show
 Lake Area
 Collision Messenger
 GoalLine
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 envelope.pict







	doc.04.pict
	Graphic Modifier
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	NoteOut
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	Graphic Modifier
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	NoteOut
	doc.10.pict
	Graphic Modifier
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	NoteOut

APPENDIX C

APPENDIX C

Reviewer Survey

Let me begin by thanking you once again for giving me some of your time in order to test my thesis project. As I have just explained, *The Watcher* is a prototype for an educational software package meant for students in grades 7 through 10. It was created based on a theoretical framework involving motivation, experience, and problem solving. In order to evaluate the effectiveness of my design, I am asking you and your fellow multimedia producers to try out the program while looking at it through a critical eye.

In order to test the true effectiveness of the program, I will **not** be available for questions during the test run. If you do run into extreme difficulties, you are free to quit the program at any time and, if you wish, restart it. While it will vary from player to player, it is expected that the program should take 20 minutes to play.

To avoid influencing your experience, please do not read the questions until you have finished running *The Watcher*. When you are done with the program, I would appreciate your honest and detailed answers to the following 17 questions. Your reactions will be the basis for the next stage of the program's development.

Thank you and enjoy *The Watcher*.

Kevin O'Gorman

Please answer the following questions as fully as possible. If you need more room, feel free to continue on the backs of the pages.

1. Did you find that *The Watcher* challenged you with obstacles and/or surprises?
 - If you did, please cite a specific occasion or two and explain what elements were effective and why.
 - If you did not, please point out a scene or two that could have been improved and make some suggestions.

2. Was it easy to identify with the main character? Were you able to lose yourself in the virtual world?
 - If so, please cite a specific occasion or two and explain what elements were effective and why.
 - If not, please point out a scene or two that could have been improved and make some suggestions.

3. Did *The Watcher* spark your curiosity?
 - If it did, please cite a specific occasion or two and explain what elements were effective in building your curiosity and why.
 - If it did not, please point out a scene or two that could have been improved and make some suggestions.

4. While experiencing *The Watcher*, did you feel like you were in control of your character?
 - If you did, please cite a specific occasion or two, explain what elements prompted this feeling and why.
 - If you did not, please point out a scene or two that could have been improved and make some suggestions.

-

7. Did any of your high school history classes come in handy while playing?
 - If they did, please cite a specific occasion or two and explain what elements were helpful and why.
 - If they did not, please cite a few things that would have been helpful to know going into the game.

8. If you made it all the way through the game, do you feel like you have a better understanding of what it might have been like as a 19th century soldier?
 - If you feel like a veteran, what elements helped you?
 - If you feel like you flunked bootcamp, what could have been added to help?

9. If you can recall one, describe a time you thought one thing was going to happen, but something entirely different did. After you thought about it, did the unexpected event make sense or do you still wonder why it happened that way?
10. Was your experience with *The Watcher* just a lot of clicking or did you find yourself caring about the outcome?
- If you were just clicking, what elements do you feel were missing?
 - If you cared, what do you think made you so involved?

- 1

13. Were you able to use your own creativity to solve problems, or was it like following a recipe?
- If you felt creative, what made you feel that way?
 - If it seemed like a recipe, what could have allowed for more creativity?
14. Did you feel trapped once you made a decision, or was there room for second chances or a change in direction?
- If you felt trapped, what made you feel that way?
 - If you were able to adjust to new events, describe one of those times.

- 1



BIBLIOGRAPHY

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Asimov, Isaac. *Asimov's Chronology of the World*. New York, NY: HarperCollins, 1991.

Dewey, John. *Experience and Education*. New York, NY: Collier Books, 1963.

Fromm, Ken, ed. *Careers in Multimedia*. Emeryville, CA: Ziff-Davis Press, 1995.

Iser, Wolfgang. *The Act of Reading*. Baltimore, MD: The Johns Hopkins University Press, 1978.

Katz, Arnie. *Inside Electronic Game Design*. Rocklin, CA: Prima Publishing, 1996.

Maddux, Cleburne D., et al. *Educational Computing: Learning with Tomorrow's Technologies*. Needham Heights, MA: Allyn and Bacon, 1997.

Merrill, Paul, et al. *Computers in Education*. Needham Heights, MA: Allyn and Bacon, 1996.

Sloane, Howard, et al. *Evaluating Educational Software: A Guide for Teachers*. Englewood Cliffs, NJ: Prentice Hall, 1989.

Soloway, Elliot. "How the Nintendo Generation Learns." *Communication of the ACM*, September 1991 v34 n9 p23(5).

Soloway, Elliot. "Quick, Where do the Computers Go?" *Communication of the ACM*, February 1991 v34 n2 p29(5).

Zettl, Herbert. *Sight Sound Motion*. Belmont, CA.: Wadsworth Publishing Company, 1990.

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