The Recombinant History Apparatus Presents: *Terminal Time*

Steffi Domike
Communication Department
Chatham College
Woodland Road
Pittsburgh, PA 15221
domike@chatham.edu

Michael Mateas
Computer Science Department
Carnegie Mellon University
5000 Forbes Avenue
Pittsburgh, PA 15213
michaelm@cs.cmu.edu

Paul Vanouse
Art Department
SUNY Buffalo
202 Center for the Arts
Buffalo, NY 14260-6010
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Introduction

Terminal Time is a history "engine:" a machine which combines historical events, ideological rhetoric, familiar forms of TV documentary, consumer polls and artificial intelligence algorithms to create hybrid cinematic experiences for mass audiences that are different every time. Through an audience response measuring device connected to a computer, viewing audiences respond to periodic questions reminiscent of marketing polls. Their answers to these questions allow the computer program to create historical narratives that attempt to mirror and often exaggerate their biases and desires. The engine uses the past 1,000 years of world history as "fuel" for creating these custom-made historical documentaries. By creating histories that clearly and instantly respond to changes in audience make-up, the project is intended to raise fundamental questions about the relationship of points of view to constructions of history particularly at the dawn of a new Millennium.

The audience interaction in relationship to the viewing experience is depicted in Figure 1. In the first question period, an initial ideological theme (from the set of gender, race, technology, class, religion) and a narrative arc (e.g. progress or decline narrative) are established. The second set of questions refines the ideological theme chosen in the first set, and possibly introduces a sub-theme (e.g. combining race and class, or technology and religion). The third set of questions further refines the theme(s) and introduces the possibility for a reversal (e.g. a decline narrative becoming a progress narrative).

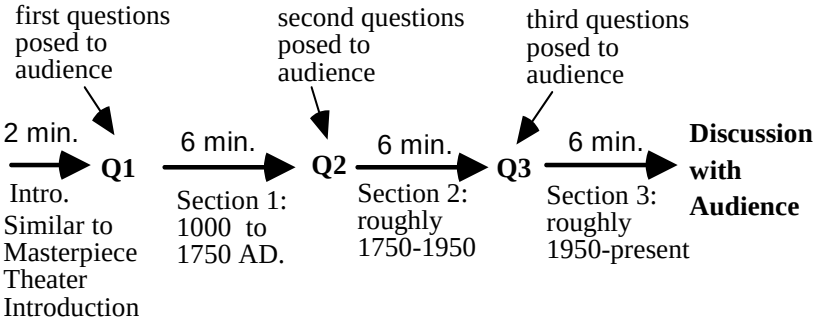

Figure 1: Audience interaction

In the rest of this article, we will examine *Terminal Time* from three vantage points: its relationship to and examination of the popular historical documentary, its function as a critique of cyber-utopian navigation and control in "new-media", and issues of authorship and representation raised by using Artificial Intelligence (AI) techniques to operationalize ideological construction.

The "Cookie-cutter Documentary"

Ever since the first moving images were recorded, filmmakers have been aware of the power of their medium to effect historical meaning; the historical documentary became one of the first identifiable film genres. The popular model of this form in America today, most clearly exemplified by Ken Burns' "The Civil War," has the familiar structure of Western narrative: each program has a distinct dramatic arc, a beginning, middle and an end. The rhetorical structure -- also familiar and now almost universally expected -- invariably involves a crisis situation, a climax, and a clear resolution. Generally there is one prevailing narrative, one interpretation of the historical facts presented. Overall the tone set is one of progress. Usually the narrative is delivered to the audience by an unseen, yet obviously white, male narrator. So popular is this model that networks and cable channels, including the public television networks, rarely show programs that diverge from it - thus the form has become even more codified.

With *Terminal Time* we imitate the model of this "cookie-cutter documentary" with a machine that produces and reproduces it, until the model itself is revealed for the tool of ideological replication that it has become. Although dominant in popular media today, the cookie-cutter documentary is just one form of historical documentary. *Terminal Time* derives its impetus from the dominance of this archetype as well as from independent attempts to challenge the authority implied in the historical documentary and to posit alternative forms.

Terminal Time, as an exploration of the documentary form, has two points of entry. One is theoretical analyses of ideological structuring in mass media, in particular those made by Soviet filmmakers active in the early revolutionary period. In those early years of cinema, a great deal of experimentation took place; *Terminal Time* is indebted to those early pioneers of the film arts for their spirited quest to understand the ideological impact of their works. The second point of entry is the present homogeneity of mass media which reflects corporate ownership of media and domination over cultural institutions.

Historical Roots for Theoretical Critique

V. I. Lenin, the leader of the Russian Revolution in 1917, encouraged the use of film as a political tool. Subsequently, Soviet filmmaking became established as an influential international model (Schnitzer, Schnitzer and Martin, 1973). In those "astonishing and wonderful days" (Schnitzer, Schnitzer and Martin, 1973: 13) of the early Soviet art world, filmmakers Lev Kuleshov, Dziga Vertov, Sergei Eisenstein, Esfir Schub and others created new visual languages. Within the context of the tumultuous expansion of Soviet art in general, and strong political support given to filmmakers in particular, the artists spoke and wrote about the theoretical challenges they faced, making important early analyses of the medium.

Filmmaker Lev Kuleshov is remembered for his deliberate tests of human cognition and film editing. He demonstrated that identical images can be used to mean very different things by pairing them with other imagery and narrative (Bordwell and Thompson, 1997: 281). He found that it is the ordering of visual data that defines the meaning of mass media. The one who controls the order, controls the message. *Terminal Time* explores the "Kuleshov effect" even further by examining how meaning of imagery can be changed when juxtaposing it against different narrative texts. In fact, the Kuleshov effect makes this project possible. Imagery is plastic - a relatively small number of different video clips can illustrate a wide range of narratives.

Early newsreel producer Dziga Vertov challenged the medium with his original form of self-referential journalism; his goal was "to break out of the proscenium of the theater and to enter the arena of life itself." Vertov strove for kino-pravda, or "cinema-truth." He abhorred staged action and stated his mission to be "the creation of a new perception of the world" (Barnouw, 1983: 58-61). If made today, his work would not be called journalism at all, but would fall under the category of experimental documentary. Today's journalists cloak themselves in objectivity, intentionally distancing themselves from their subjects of inquiry. This technique has been instantiated throughout the media apparatus such that "news" is now universally presented as unquestioned truth, having no relationship to the person or corporate entity charged with its telling. *Terminal Time* further explores the notion of cinema-truth by creating an endless set of possible truths, all stemming from the expressed desires of the audience, who in this case are charged with choosing how the "truth" is told.

Esfir Schub's meticulous inter-cutting of footage of war, strikes, and other contemporary images of human suffering and struggle with home movies shot for Tsar Nicholas II instilled the home movies with new meaning. Images of the opulent lifestyle of the Romanovs were transformed and revolutionized through visual contrast. Barnouw credits Schub's editing work, in *The Fall of the Romanov Dynasty* (*Padeniye Dinasti Romanovikh*, 1927) and

two subsequent pieces, with advancing the genre of newsreel compilations (Barnouw, 1983: 66). Shub also demonstrated that, original intentions notwithstanding, documentary film footage could be manipulated and its meaning re-contextualized to create powerful, alternative readings of history. *Terminal Time* is clearly indebted to Schub's work, as re-contextualization of historical materials is central to our endeavor.

Although Sergei Eisenstein's work was in historical fiction as opposed to historical documentary, he wrote extensively about the key role of montage in building film meaning and the power of film over perception. He stated that montage should be seen "as a means before all else of revealing the ideological conception [of the film]" (Eisenstein, 1949: 244). In operationalizing Eisenstein's ideas, *Terminal Time* intends to expose to the audience how montage functions in this "revealing," thereby creating new perceptions of the world based on awareness of ideological conception.

Corporate Media Dominance

The media experience of today is primarily in the living room, as opposed to the theater or public arena of early Soviet times. The television is the screen. As Lenin realized eighty years ago, the moving image is a powerful tool for propaganda and political control. In today's world of television, he who controls the screen controls the content and form of the programming. While Americans and the U.S. political education system may interpret Lenin's interest in film and the power of mass media in light of his attempts to control the minds of his countrymen and extend the political power of the communist state, few extend that same critique to the contemporary corporate media apparatus which controls American mass media today.

In April 1997, the big four television networks, General Electric (NBC), Westinghouse (CBS), Disney (ABC) and Rupert Murdoch's News Corporation (Fox) were each given six megahertz of the digital broadcast spectrum, enough for each corporate enterprise to create four to six digital channels (McChesney, 1997: 21). The cost to the four corporations is the return of their current analog broadcast spectrum to the Federal Communications Commission once the changeover from analog to digital systems is complete. These same corporate entities that control mass media in America today will continue to exert hegemony into the next millennium. Analog systems and broadcast spectra, which will revert to the "public domain," will quickly become obsolete due to new digital equipment standards. Citizen's lobby Common Cause reports that 98 percent of American homes have televisions, that most Americans get most of their news from TV, and asserts that the broadcast industry has the "ability to shape the national news agenda by controlling the messages that TV viewers will and will not see" (Common Cause 1997). It is not a great leap to conclude that the national news agenda and the public presentation of history reflects a combined corporate ideology.

At the same time, public television stations across the United States are struggling to survive. Most stations have already eliminated local production, becoming venues for uncritical social history documentaries, cooking shows and science and nature programming. Public television in America has not generally fostered community involvement or alternative points of view in show production and/or content. Media watcher Robert McChesney points out that public stations in the U.S. are far more inclined than public stations in Canada and Great Britain to reflect elitist culture due to their reliance on local and corporate underwriting (McChesney, 1996).

Corporate control of broadcast and cable television has kept innovative and critical historical documentaries, as well as media of other genres, from reaching the public. With the "cookie-cutter documentary" model, the story of any particular moment is presented as the historical truth. Historical data, facts, quotes and imagery are carefully edited to seamlessly produce the narrative. Control of ideological messaging is exerted firstly through choice of subject matter and secondly through the style of narrative production. Both form and content, thus combined, have become codified as the "mass media method" for discussing historical issues.

Enforcement of the code is accomplished by the dominant media apparatus through control of funding and access. Commercial, public and cable television systems exclusively air works produced in the approved format, newspapers review and promote them, and they are favored by popular cinema distribution companies. Ken Burns' "The Civil War" exemplifies adherence to this code; Burns has been well rewarded for his compliance by corporate funding and network access (Litwack, 1994: 16-18).

These funders and maintainers of the apparatus, here referred to as "The Generals", include General Electric, General Motors, General Foods and countless other high brass of corporate culture. Their backing, unlike the backing of labor unions, community organizations and issue-oriented groups, is deemed non-political by public agencies such as the public broadcasting system (Potter, 1998). Support from "The Generals" insures broadcast and/or wide theatrical release of a media production. Support from tainted groups virtually insures marginality. For example, PBS has denied airplay to works supported by more than 50% by Union based organizations (Potter, 1998). Ironically, organizations such as Mobil Oil are seen by organizations such as PBS as ideologically neutral.

Subverting the Generals

In 1991, Steffi Domike (one of the three *Terminal Time* producers) and film partner Nicole Fateux turned their attention toward the 1892 Homestead Steel Strike, involving Pinkerton Guards, Andrew Carnegie, Henry Clay Frick

and thousands of unknown and for a century unsung community members and workers. They wished to tell the story of the strike from the point of view of the striking works as opposed to the historically over-represented points of view of the rich and powerful Andrew Carnegie and Henry Frick. In 1993, with seed money from unions (United Steelworkers of America, Service Employees International Union and others), the Commonwealth of Pennsylvania and local granting agencies, they released the hour-long film, *The River Ran Red*.

The work intentionally mimicked the dominant form of the historical documentary in an effort to have this story of open and articulated class struggle broadcast to the nation. When the finished product was presented to the producers of the PBS series The American Experience, the producers of *The River Ran Red* were told that although the program looked and sounded very good, the station (WBGH, Boston) already had plans to tell the Pittsburgh story of that period through the life and accomplishments of none other than Andrew Carnegie!

Thus in 1996, three years after *The River Ran Red* was broadcast across Pennsylvania, WGBH's *The Richest Man in the World* enjoyed a national PBS release, using many of the same images, sounds, music, quotes and re-enactments demonstrated in *The River Ran Red*. Yet even using much of the same source material, the differences in editing and narrative structure made the message quite different. The different use of two images, described here, demonstrate how the perspectives of the two filmmaking groups molded the visual and historical record to suit their respective causes.

A portrait of young Andrew Carnegie with his brother Thomas, taken shortly after their arrival in America, is used in both films. *The River Ran Red* cut out Thomas altogether, zooming in slowly to a close-up of the youthful industrialist-to-be: "Carnegie was a poor weaver's son when he left his native Scotland in 1848. By the 1880s he had become one of America's leading industrialists." In contrast, *The Richest Man in the World* uses the same photo full-frame to illustrate the psychological pressures being placed on Andrew Carnegie by his mother in the lean years before migrating to America. The narrator discusses Margaret Morrison's utter embarrassment at her poverty and the failure of her husband to move the family up the local social ladder: "The Boy would have been extremely conscious of this. Andrew would feel the pressure of his mother's shame as well as the preference she showed his brother Tom."

A stereographic image of Homestead, with children in the foreground, the town and mill in the distance, is used in both films to introduce the town. *For The River Ran Red*, the town is introduced directly after a montage on industrial hazards and injuries. "Homestead was radically different. Work in the mill was just as hazardous, but steelworkers had built a powerful union which gave them a say in hiring, wages and how jobs were done." *The Richest Man in the World*, on the other hand, uses the image behind the following: "The town itself was foul. Garland wrote of 'great sheds out of which grim smokestacks rose, with a desolate effect--like the black stumps of a burned forest of great trees.'" Interestingly, this exact quote, penned by novelist Hamlin Garland in 1894 (two years after the strike was broken), is used at the end of *The River Ran Red* to build a picture of the ultimate effect of Carnegie's policies on the town.

Clearly, images and words from the past can become re-coded to project whatever the filmmaker desires. With *Terminal Time* we intend to subvert the Generals by turning the "cookie-cutter" loose on the entire past millennium of human history. By incorporating audience feedback, *Terminal Time* allows the audience to manipulate the framing of the documentary and to interrogate its pose of objectivity. We invite the audience to join us in questioning the dominant, ideologically coded mode of producing history.

Interrogating “Individual Choice”

There is a great deal of industry hype surrounding interactive media and computing. Typically such experiences are promoted through a rhetoric of utopian navigation. According to such rhetoric, the computer provides unlimited access to information and experience, a pure source of empowerment that imposes no interpretation on the data that is processed. Other familiar tropes in this rhetoric include: real-time, immersion and virtuality -- promising the thrill of reality or hyper-reality, without the effort, right from one’s own PC. Microsoft’s ads softly beguile us with the question “Where do you want to go today? ®”

Interaction leaves a trace. The flip-side of utopian navigation is demographic data collection. Especially as more computer-mediated interaction moves into networked environments (e.g. the Web), the very acts of user intentionality, those manifestations of the power of free choice lauded by information technology enthusiasts, have become the raw material for corporate data collection. By collecting, sorting, and categorizing acts of user interaction, corporations hope to sell users ever more precisely targeted products. "Where do you want to go today?" becomes "What do you want to buy today?"

Terminal Time is an exploration of both these dynamics, utopian navigation and demographic data collection. However, *Terminal Time* is not intended as a pure debunking exercise showing that all things interactive are bad. It is certainly the case that information technology has provided easier access to larger amounts of information. In fact, the producers of *Terminal Time* took advantage of the web in doing historical research for the project. Rather than debunking, *Terminal Time* is intended as an exploration of some of the unexamined assumptions and unintended side effects of information technology.

Utopian Navigation

In the worldview of utopian navigation, the computer is seen as a value-free conduit, an executor of user agency. Even the use of the word "navigation" is telling - it moves the focus onto the user's movement in some data space and away from the system's active manipulation of that data. The computer is seen as pure communication device, pure medium. Of course in this post-McLuhan age it is considered a given that a medium is not a passive pipe, but rather the active messenger of a worldview (McLuhan, 1964). But the computer as medium has unique properties that can mask this understanding. Two such properties, identified by Janet Murray (Murray, 1997), are the participatory and encyclopedic nature of digital environments.

The participatory nature of digital environments means that they take action in direct response to user input. Generally there is only a short lag time between user action and the system's response to the action; the user experiences an immediate gratification of the desire to effect the system. But this immediate gratification can mask the recognition of the fact that the system's authors have determined the boundaries of this interaction. The system can only reflect the user's actions within the limits of the structures and processes envisioned by the system's designers.

The encyclopedic nature of digital environments means that they have vast capacity. The amount of information in digital environments often exceeds the amount the user can comprehend as a whole. It is impossible to access every record in a database, every document on the web. This enormous capacity is generally coupled to processes that enable access to the stored information, such as search engines and navigation interfaces. This combination of encyclopedic capacity and participatory access can imbue the user with a feeling of great power - all knowledge appears to be at one's fingertips. But the encyclopedic nature of digital environments can mask the recognition that the system's authors have excluded information from the system and prevents the user from asking why only certain forms of interaction are allowed.

Demographics in the Electronic Landscape

We use the term “electronic landscape” to refer to the immense corporate/institutional networks of interlinked technologies and databases that touch our lives. One need not look too hard for examples: video rental stores often keep digital records of a patron's entire rental history as America learned during the Robert Bork confirmation hearings in 1987, or as we see on the other side of the U.S. political spectrum with Kenneth Star's subpoena of Kramerbooks for records of all Monica Lewinsky's book purchases. Yet, it is not merely the individual institutions usage of these records that is of concern. Data collection achieves its full power when the data is traded between companies, concatenating personal data from many sources into detailed, if Frankensteinian, digital profiles. Recently, the Metromail Corporation, which maintains and sells records from a detailed data base of over 90% of American households, has come under scrutiny for allowing such records to fall into the hands of convicted sex offenders. In the case of Metromail, one randomly selected individual was represented by over 900 pieces of data including address, income, ailments, marital status, hobbies, etc., as well as detailed purchasing habits (Bernstein, 1994).

Such examples reveal that within the contemporary electronic landscape, each interaction concatenates to the regime of a virtual data-body, constructed and existing in virtual space. These virtual identities are constantly updated with information about credit ratings, spending habits, video preferences, ATM usage, medical history, driving records and numerous other bits of information. Artist Jeffrey Schulz calls this data space the “identity economy” and notes that “...every telephone call, every withdrawal of money from a bank account, every mail order, every magazine subscription, every visit to a doctor, etc., — creates a potential surplus of demographic identity information” (Schulz, 1993: 160).

The internet, particularly the World Wide Web, provides an example of the relationship between utopian navigation and data collection. Network technology enables marketers to monitor a user's activities within a site, as well as terms entered in data-retrieval engines. Detailed web site “registration” processes allow sites to associate browsing behavior with personal information, thus making the information collected even more valuable to advertisers. The idea of uniquely identifying a user has even been pushed into the computing infrastructure itself. Both Intel and Microsoft have had to manage the corporate relations snafu arising from the revelation that Intel's Pentium III microprocessor, and Microsoft's operating system Windows 98 both broadcast a unique machine identifier when connecting to the network (Clausing, 1999; Markoff, 1999). While ostensibly put in there for "debugging" purposes, such an identifier certainly makes the task of automated demographic data collection easier.

The contemporary landscape is inhabited by many mechanisms to extract data from our pleasures and desires as well as presumably fears and dislikes. As advertisers begin to better utilize non-exclusionary marketing approaches based upon appropriated pluralist discourse and electronic, networked interfaces designed to process more sophisticated blocks of data, our culture approaches an interesting threshold. Here every action is an interface. Here every passing whim or building need may be immediately analyzed for the perfect commodified remedy, suggested by ubiquitous marketers perfectly in accord with our financial assets. At this threshold, all of our subjective interests serve to forcibly fix our position within a marketing database. *Terminal Time* explores this convergence of utopian navigation with demographic data collection by using audience polling to target market histories of the world which are not actually intended or desired.

A Democratic, Recombinant History

Utilizing indirect questionnaires as a user interface, the system essentially target markets each audience with an appropriate history. Rather than asking audiences what type of history they would like, or how they would like to navigate through history, they are asked questions about their own demographics and psychographics: their work status, what cultural trends they find most disturbing, how well they get along with others, etc. The resulting history holds a funhouse mirror to the audience, reflecting an exaggerated and distorted view of the audience's biases. A sample question follows.

> What is the most pressing issue facing the world today?
> A. Men are becoming too feminine and women too masculine.
> B. People are forgetting their ethnic heritage.
> C. Machines are becoming smarter than people.
> D. Its getting harder to earn a living and support a family.
> E. People are turning away from God.

The most unfamiliar and perhaps unsettling feature of the interaction is that audiences must publicly applaud for their given answers, changing a simple response into a public display. The applause meter was chosen as the input device for two reasons: ease of setup in different venues and the audience dynamic created by public applause. The applause meter requires no special setup in a theater. All that is required is a good quality directional microphone and a small mixing board. Alternative input devices, such as buttons or knobs placed at every seat, would be difficult to install. Such devices would effectively prevent *Terminal Time* from traveling to many venues. More importantly, applause metering enables interesting and entertaining audience dynamics. These interaction dynamics was originally explored in *The Consensual Fantasy Engine*, an interactive cinema piece by Paul Vanouse and Peter Weyhrauch (Vanouse and Weyhrauch, 1995).

The applause interaction creates a collaborative, yet competitive relationship with other audience members. The interaction is collaborative in the sense that the phenomena is totally collective, yet competitive because the winning responses will inevitably change the ensuing representation of world history, the very basis from which ethnic, religious and ideological self-awareness has stemmed. With applause, the audience members can gauge how the audience as a whole is responding to questions. During the interactive polls, segments of the audience sometimes compete for control, clapping and shouting to make their choice the winner. At other times, the audience laughs when a choice meets with silence (no one wants to vote for it). Sometimes the applause grows into a groundswell of whistling and clapping as it becomes clear that certain choices are nearly unanimous.

Of course the audience experience is determined not only by the points of interaction, but also by the audience's reaction to the historical narrative produced. The audience recognizes that their interaction has an influence on the historical narrative, but, unlike a utopian navigation scenario, the resulting narrative is not a perfect, transparent response to their interaction. Rather, the narrative escapes their control, producing a story they did not intend, nor desire. As the history begins 1000 years ago, the audience should experience a comfortable sense of historical authority engendered by the familiar documentary form and the remoteness of the historical events. As the history unfolds, the effect of the periodic audience polls becomes more and more apparent. The increased bias evident in the history should begin creating a tension with regard to the veridicality of the history (a sense of "wait a minute, this doesn't seem quite right...").

In order to fully appreciate the piece, an audience should see it more than once. In a typical hour-long performance, an audience will be able to see two performances. In the second viewing, even if the audience answers the polls in exactly the same way, they will experience a different history . Seeing two different histories back-to-back makes the effect of ideological bias in historical construction fully apparent. Typically, during the first performance, audiences respond to the questions truthfully, that is, actively trying to reflect their true beliefs in their answers to the questions. During the second performance they tend to respond playfully to the questions, essentially trying on different belief systems to see how this will effect the resulting history. While this could be seen as "game-like" psychographic tourism on the part of the audience, this reaction seems to indicate an understanding of the influence of belief system (as reflected in the answers to the questions) on the resulting history.

Authorship and Representation

Terminal Time is informed by a conception of AI as an expressive medium (Mateas 1999; Sengers 1998). Expressive AI conceives of AI systems as cultural artifacts. The concern is not with building something that is intelligent independent of any observer and cultural context. Rather, the concern is with building an artifact that seems intelligent, that participates in a specific cultural context in a manner that is perceived as intelligent. Expressive AI views a system as a performance. Within a performative space, the system expresses the author's ideas. The system is both a messenger for and a message from the author. Expressive AI thus changes the focus from the system as a thing in itself (presumably demonstrating some essential feature of intelligence), to the system as a communication between

author and audience. At the technical level of building the artifact, the technical practice becomes one of exploring which architectures and techniques best serve as an inscription device within which the authors can express their message.

As authors, we have specific artistic goals and audience experiences we are pursing with *Terminal Time*. The project would lose meaning if we could not exert authorial control over the histories generated by the system. Of course, maximum authorial control would consist of writing a fixed set of canned histories; audience interaction would select one of these canned histories. But this extreme of control is inappropriate for this project on several grounds. Conceptually, the project depends on the machine "really constructing" the histories. The critique of the computer as a passive conduit of information requires that the computer actually take on an active role as a semi-cooperative genie, obviously responding to the choices voted on by the audience, but taking these choices to extremes. And on practical grounds, the number of possible histories resulting from all possible answers to all the questions is too large to build by hand. So, even if the conceptual purity of the piece did not demand it, practical necessity would require that the computer play an active role in story construction. As we reject the extreme of pure hand-authoring, we also reject the extreme of strongly emergent architectures, that is, architectures in which as little high-level knowledge as possible is given to the system, with all high-level behavior resulting from large numbers of statistical combinations of low-level elements. Such architectures by definition make authorship highly problematic. In a sense, they provide no authorial "hooks," no places within the architectural in which an author can inscribe her intention, can exert specific control. Much of the architectural work that went into the iterative prototyping of *Terminal Time* was a search for an architecture providing authorial "hooks" on the right level of abstraction: fine-grained enough to allow significant combinatorial possibilities and the capability for surprise, yet providing the appropriate authorial affordances to allow the exertion of authorial control over multiple levels of the story construction process.

The Terminal Time Architecture

Terminal Time's architecture consists of the following major components: knowledge base, ideological goal trees (Carbonell 1979), rule-based natural language generator, rhetorical devices, and a database of indexed audio/visual elements primarily consisting of short digital movies and sound files containing music (for more architectural details than are provided in this chapter, see (Mateas, Domike and Vanouse, 1999; Mateas, Vanouse and Domike, 2000)). The architecture is depicted in figure 2. The knowledge base contains representations of historical events. This is the raw material out of which the ideologically-biased histories are constructed. Examples of historical events are the First Crusades, the invention of Bakelite, and the rise of enlightenment philosophy. Ideological-goal trees represent the current ideological-bias being pursued by the narrator. The goal-trees consist of rhetorical goals ordered by subgoal and importance (to the ideologue) relationships. These goals are used both to select historical events to include in the story and to "spin" the event in an ideologically-consistent manner. The rule-based natural language generator (NLG) generates the narrative text once specific facts have been selected and connected to make a story. The storyboard serves as a working memory for processes that impose a narrative order on event spins created by the goal tree. Rhetorical devices are connecting pieces of text with accompanying constraints on story structure. These devices are used to create narrative connections between historical events. Finally, the multimedia database contains the audio/visual elements for the assembled documentary. Once a narrative track has been constructed, information retrieval techniques are used to match the "best" indexed multimedia elements to the appropriate pieces of text. Once the multimedia elements have been selected, the resulting documentary is displayed, layering text-to-speech synthesis of the narrative track, and the video and audio elements.

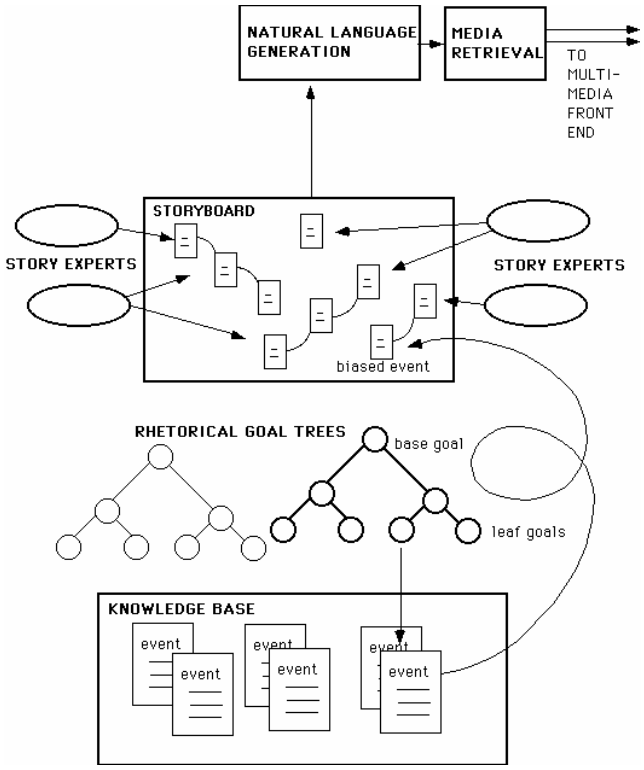

Figure 2: *Terminal Time* architecture

The audience's responses to the questions influence the machine by selecting and editing rhetorical goal trees, selecting a set of rhetorical devices, and placing constraints on the storyboard. In a sense, the audience response parameterize the machine. The responses activate structures and processes; the machine then autonomously generates a biased history.

The knowledge base consists of higher order predicate statements about historical events, definitions of ontological entities used in the historical event descriptions, and inference rules. *Terminal Time*'s ontology is based on the Upper Cyc Ontology, the top 3000 most general terms in the Cyc ontology (Lenat 1995). The Upper Cyc Ontology is available free of charge from Cycorp. The upper ontology provides a useful set of distinctions in terms of which the more specific ontology needed by *Terminal Time* can be defined. Figure 3 shows the representation of the historical event "The Giordano Bruno Story."

```
($isa %GiordanoBrunoStory %HistoricalEvent)
($isa %GiordanoBrunoStory %IdeaSystemCreationEvent)
($isa %GiordanoBrunoStory %Execution)
(%circa %GiordanoBrunoStory (%DateRangeFn
   (%CenturyFn 16) (%CenturyFn 17)))
($eventOccursAt %GiordanoBrunoStory $ContinentOfEurope)
($performedBy %GiordanoBrunoStory %GiordanoBruno)
($outputsCreated %GiordanoBrunoStory %GiordanoBrunosIdeas)
($isa %GiordanoBrunosIdeas $PropositionalInformationThing)
($isa %GiordanoBrunosIdeas $SomethingExisting)
(%conflictingMOs %GiordanoBrunosIdeas %MedievalChristianity)
($isa %GiordanoBrunosIdeas %IdeaSystem)
($performedByPart %GiordanoBrunoStory
    %TheRomanCatholicReligiousOrg)
($objectActedOn %GiordanoBrunoStory %GiordanoBruno)
```

Figure 3. Formal representation of the Giordano Bruno story

The formal representation of historical events is manipulated by processes (described below) which select events for inclusion in a story, produced biased spins of events, link spins together into narratives, and generate narrative text.

Terminal Time organizes ideological bias with goal trees, adapted from the ideological reasoning program Politics (Carbonell 1979). These goal trees represent the rhetorical goals of an ideological story-teller. For example, the Hard-core Anti-religious Rationalist has as one of its top level goals *show that religion leads to evil*. Two subgoals are *show that religion causes war* and *show that religion causes oppression.* Audience interaction defines and modifies the current active goal tree. Audience interaction may add, delete, or change goals in the goal tree. Two different ideological positions can be mixed by combining goals from two goal trees. For example, the audience's answers to the first set of questions may select the Hard-core Anti-religious Rationalist goal tree. Answers to the second set of questions may determine that racial equality (exaggerated as a homogenized "Bennetton commercial" multiculturalism) is a sub-theme. The goal tree is modified to include the Corporate Multiculturalist goals in addition to Hard-core Anti-religious Rationalist goals, thus producing a hybridized ideological narrative. Some responses to questions (particularly questions in the third and last set) modify the tree more subtly, adding and removing individual goals in the tree.

These goal trees scan through the knowledge base to select and produced biased spins of events for use in a story. The "spun" events are put into a conceptual container called the storyboard. Rhetorical devices than connect the event spins into a narrative structure. Rhetorical devices are sentences (actually declarations of NLG rules and arguments) that can connect episodes or collections of episodes together to create a story flow. For example, the sentence "Yet progress doesn't always yield satisfaction" can be used to connect several episodes describing the positive effects of technological progress and several episodes describing social or environmental problems arising from technological progress. Associated with the English sentence is a formal representation constraining the meanings that episodes before and after the rhetorical device can have. For example, "Yet progress doesn't always yield satisfaction" has constraints specifying that everything preceding the rhetorical device must be positive technological, artistic, or industrial progress, and that everything following the rhetorical device must be negative effects of progress.

Once a collection of spins has been connected together by rhetorical devices, the resulting story, which at this point still consists of only formal representations, is sent to the natural language generator to produce the actual narrative text. In addition to generating text, the natural language generator associates index terms with each generated sentence. These index terms are used to retrieve appropriate movie and sound clips from a term-indexed multimedia database. Even though the mechanisms linking images to narrative are less sophisticated than the mechanisms producing the narrative, the Kuleshov effect ensure that the resulting juxtaposition of image and narrative will still make sense to the audience.

This architecture was arrived at through an artistic as well as technical exploration. We desired an architecture that creates narratives rendering our authorial intent without necessarily portraying our own ideological viewpoint. Through such an architecture we can see stories created that might involve unusual causal relationships or unexpected conclusions, that, while satisfying us as authors, go beyond our own conceptions. Additionally, the history construction process captured in the software architecture is itself of conceptual interest. We see it as a caricature of ideological thought and "cookie-cutter" documentary construction, an explicit comment on the mechanical nature of shallow ideological reasoning. Our engagement with AI in the *Terminal Time* project is a concrete example of expressive AI. The AI architecture serves the needs of, and simultaneously informs, our artistic intent.

Conclusion

Terminal Time interrogates three cultural constructs: the naturalization of history in the historical documentary, the rhetoric of choice in cyberculture, and representations of knowledge and intelligent activity in Artificial Intelligence research. Our critique makes full use of the resources available in the very cultural fields under discussion. We explore the naturalizing tendency of the documentary using the filmic grammar of the documentary, comment on utopian navigation using interactive technologies, and point the way to an alternative conception of AI by building an AI program. The self-referential use of cultural resources and naïve hubris are the defining characteristics of the creative process employed in building *Terminal Time*.

References

Barnouw, Erik. (1983). *Documentary: a history of the non-fiction film.* New York: Oxford University Press.

Bernstein, Nina (1994). Lives on File: Privacy Devalued in Information Economy. *The New York Times on the Web*, June 12, 1994, 1-11.

Bordwell, David and Thompson, Kristin (1997). *Film Art*. McGraw-Hill Publishers.

Carbonell, Jaime (1979). *Subjective understanding: Computer models of belief systems*. Ph.D. Thesis, Computer Science Department, Yale University, Research Report #150, 1979.

Clausing, Jeri (1999). Privacy Groups Seek Recall of Intel Chip. *The New York Times*, January 29, 1999.

Common Cause (1997). Your Master's Voice. *WIRED*, August 1997, 45.

Eisenstein, Sergei (1949). Dickens, Griffith and the Film Today. In Jay Leyda (Ed.), *Film Form.* New York: Harcourt, Brace and World. Cited in Grindon, page 22.

Grindon, Leger (1994). *Shadows on the Past: Studies in the Historical Fiction Film*. Philadelphia: Temple University Press.
Lenat, Doug (1995). Cyc: A Large-Scale Investment in Knowledge Infrastructure. *Communications of the ACM*, 38, (11).
Litwack, Leon (1994). The Civil War. In Sean Dolan (Ed.), *Telling the Story: The Media, The Public and American History*. Boston: New England Foundation for the Humanities.
Markoff, John (1999). Microsoft to Alter Software in Response to Privacy Concerns. *The New York Times*, March 7, 1999.
Mateas, M., Domike, S., and Vanouse, P. (1999). Terminal Time: An Ideologically-Biased History Machine. *AISB Quarterly: Special issue on Creativity in the Arts and Sciences*, Summer/Autumn 1999 No. 102, 36-43.
Mateas, M., Vanouse, P., and Domike S. (2000). Generation of Ideologically-Biased Historical Documentaries. In *Proceedings of AAAI 2000*. Austin, TX, 236-242.
Mateas, M. (2001). Expressive AI: A hybrid art and science practice. *Leonardo: Journal of the International Society for Arts, Sciences, and Technology* 34 (2), 147-153.
McChesney, Robert W (1997). The digital TV heist. *In These Times*, Vol. 21, No. 13.
McChesney, Robert W (1996). *Corporate Media and the Threat to Democracy*. New York: Seven Stories Press.
McLuhan, Marshall (1964). *Understanding Media: The Extensions of Man*. New York: New American Library.
Murray, Janet (1997). Hamlet on the Holodeck: The Future of Narrative in Cyberspace. Cambridge, Mass.: The MIT Press.
Potter, Chris (1998). Too Hard Hat to Handle? PBS's double standards with labor underwriting. *Pittsburgh City Paper*, March 11, 1998, 8.
Sengers, Phoebe (1999). Designing Comprehensible Agents. In *Sixteenth International Joint Conference on Artificial Intelligence: Vol 2* (1227-1232).
Schnitzer, Luda, Schnitzer, Jean, and Martin, Marcel, Eds. (1973). *Cinema in Revolution: The Heroic Era of the Soviet Film*, New York: Hill and Wang.
Schulz, Jeffrey (1993). "Virtu-Real Space: Information Technologies and the Politics of Consciousness." In Simon Penny (Ed.), *Machine Culture. Visual Proceedings: The Art and Interdisciplinary Programs of SIGRAPH 93*. New York: The Association for Computing Machinery.
Vanouse, Paul, and Weyhrauch, Peter (1995). *The Consensual Fantasy Engine: An Audience-driven Interactive Fiction*.