Tired of Giving In:
An Experiment in Narrative Unfolding

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We present a model for structuring computer-based narratives so that viewers can interact without changing the story. Instead, interactions reveal the story through varying perspectives and at varying levels of detail. The story maintains its integrity while taking on progressively deeper meanings. Viewers are like members of a Greek chorus who query characters and comment on events. We describe lessons learned from a prototype that retells the story of the 1955 arrest of Rosa Parks and events leading to the Montgomery Bus Boycott. Lessons include observations about narrative structure, writing to support narrative unfolding through user interaction, designing the multimedia interface to communicate conditions for interactivity, and implementing the program so that information about user interactions helps to control the presentation. We include some projections for using the chorus model to support multiuser interactions.

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Abstract

We present a model for structuring computer-based narratives so that viewers can interact without changing the story. Instead, interactions reveal the story through varying perspectives and at varying levels of detail. The story maintains its integrity while taking on progressively deeper meanings. Viewers are like members of a Greek chorus who query characters and comment on events. We describe lessons learned from a prototype that retells the story of the 1955 arrest of Rosa Parks and events leading to the Montgomery Bus Boycott. Lessons include observations about narrative structure, writing to support narrative unfolding through user interaction, designing the multimedia interface to communicate conditions for interactivity, and implementing the program so that information about viewer interactions helps to control the presentation. We include projections for using the chorus model to support multiuser interactions.

Keywords

interactive narrative	*computers and theater*	*Montgomery Bus Boycott*
interaction design	*Greek chorus*	*Rosa Parks*
agent technologies	*Civil Rights Movement*	*Martin Luther King, Jr.*

Contents

Introduction

We address this paper to three groups of readers: those who are interested in how the telling of a civil rights story, in particular the arrest of Rosa Parks, can adequately represent the range and roles of people involved; those interested in how a theatrical model, particularly the Greek chorus, can facilitate viewers' interactions with the narrative; and those interested in computational treatments of narrative and interactive structures. We describe a research prototype that helped us to resolve some questions while revealing others that would need to be addressed in a next-step implementation.

The Context of "Interactive Narrative"

Stories told through interactive computational media raise an old question in new ways: What happens to stories when listeners and viewers can interact with the presentation? Traditional storytellers often incorporate responses from their audiences. Indeed, this concern may define a teller's style: the teller may pause from time to time to sense the audience's mood, listen for responses, or solicit reactions, and adjust the story's tempo and emphases accordingly.

For our purposes, "telling" means presentation through computer control of the multiple channels of speech, music, still images, and moving images.[1] We also consider how inputs from the viewer can affect the presentation.[2] Our experiment has primarily to do with narrative structure: how can it be flexible enough to provide interesting, individualized variations of presentation, yet stable enough to ensure that key aspects of the story remain intact? This consideration is particularly important in the realm of nonfiction.

Many experiments with "interactive narrative" have focused on fictional tales. Some of these experiments are rooted in text-based games like "Dungeons and Dragons." Typically in this genre, readers choose from among several possible events or decide which of several endings should complete the story. Unfortunately, such branching structures tend to fragment the plot, often leaving readers (and now viewers) feeling dissatisfied. As computational media mature, developers seek other strategies for resolving user interactions into coherent presentations. Experiments have focused on narrative form, transition, and character [e.g., Axelson 1997; Bates 1992, 1994; Brooks 1996; Davenport et al. 1991; Gallean 1996; Strohecker 1986; Laurel 1990, 1991; Murray 1995, 1997; Negroponte 1979; Tsarkova 1997].

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[1] Here we describe a prototype that uses two-dimensional imagery and inputs from a single device. See "Further Work" for considerations of extending the model to graphical multiuser environments.
[2] We refer to the computer user as the "viewer" even though experiencing the narrative has to do with more than just seeing. Of course "viewer" is an unfortunately passive term for one who is looking, listening, taking actions, and constructing meaning throughout the course of a program. However, alternative terms present their own dilemmas: "participant" and "interactor" have preferable connotations but tend to become unwieldy, "player" suggests too strongly the context of a game, and "user" sounds like one who is addicted to computers.

As network technologies have enhanced computational platforms, text-based games have evolved into multiplayer environments and scenarios. Developers and players tend to emphasize modes of interactivity such as role-playing and way-finding. Additionally, the so-called MUDs[3] and MOOs[4] typically have an associated programming language that players can use to create characters and extend the environment. Constructing and socializing comprise the interactivity [Curtis 1992; Bruckman & Resnick 1995; Turkle 1995]. Often, narrative environments are enriched by algorithms that control the story presentation or automate objects and characters. Automated characters, often called "agents," may interact with each other or address the live characters. Increasingly, artificial-intelligence technologies are making possible interesting explorations of character and more coherent associations between story elements [Bates 1994; Brooks 1996; Gallean 1996; Hayes-Roth & van Gent 1997; Laurel 1990; Laurel et al. 1994; Maes 1989, 1992].

Thus, in developing computational media to generate and present stories, researchers, media producers, and artists have grappled with such issues as point of view, continuity, pacing, granularity, and authorship. We continue to face a complex problem: What are the characteristics that sustain a compelling narrative? What is the media producer's role with respect to these characteristics? What is the viewer's role? We are seeking a model that gives primacy to the essential narrative elements of plot and character, which we want to *develop*, not to fragment nor to obfuscate.

We share this aim with other storytellers dealing with nonfiction, who tend to be interested in plot treatments that encourage viewers to interact but preserve the story's integrity. One approach has been to distribute the plot so that viewers uncover aspects of it as they explore the story system. Abbe Don's [1991] *We Make Memories* provides an interface to her family's oral history, organized as many smaller stories that the viewer can access in any order. As family members recount memories of their immigration and life in the United States, the viewer constructs an understanding of the context and the larger story. *Guides* uses a similar treatment for the history of westward expansion in the United States [Oren et al. 1990; Don 1990]. Again there is more than one teller, as well as an emphasis on the important idea that history is not a matter of objective fact, but of perspective. People experience, remember, and relate events and circumstances differently.

In another experiment, [Strohecker 1986] sought to structure interactivity as a form of character development. *A Different Train of Thought* is based on a particular story: it begins in a certain way, certain events occur involving certain characters, and it ends in a certain way. Different characters see events in different ways, however, both literally and symbolically. Both meanings of point of view play out as the story progresses. Viewers interact by accessing representations of characters' thoughts. These thoughts often pertain directly to an event, but sometimes to some idiosyncratic association in the character's

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[3] "Multi-User Domains," originally dubbed "Multi-User Dungeons"
[4] "MUD Object-Oriented"

mind. Such images can reveal crucial aspects of character, supplementing portrayals of the character's actions or allusions to one character by another.

The story described here, *Tired of Giving In,* also maintains a particular storyline. We recount events leading to the 1955 arrest of Rosa Parks and organization of the Montgomery Bus Boycott. In spite of varying accounts of these events, certain elements are a matter of record. In some cases even the details on record are arguable, but there can be no doubt that certain events occurred: there was an atmosphere of tension surrounding the issue of desegregation, much of it played out on public transportation, Rosa Parks was arrested, and phenomenal numbers of people stayed off the city's buses. These are the events we – and viewers – explore through the multiple perspectives of characters and chorus members.

The Greek Chorus as a Narrative Device

Psychological theorists have considered the importance of internalized "voices" forming a kind of chorus that influences individuals' thinking [McGoldrick 1982, Strohecker 1999]. More modestly, we can note that forms of dramatic chorus appear in theater works of various cultures. A recent performance by Ladysmith Black Mambazo, for example, provides musical commentary alternating with dramatic enactment [Shange et al. 1994]. In *Nomathemba,* the chorus address both audience and actors, as a daring young woman changes mindsets while renewing love in the midst of contemporary South African upheaval. In this performance, the chorus reflect aspects of traditional storytelling while providing narrative continuity and musical entertainment.

In ancient Greek theater, the chorus evolved through several eras and incarnations. Initially the chorus were separate from the actors in role, location, and appearance, but over time they merged more and more with the actors and the action. At first a collective, singing, dancing, and speaking together, chorus members gradually emerged as individual speakers. Originally anonymous, their uniform identities accentuated by masks, chorus members gradually appeared as personalities with particular views on issues and events. And, beginning as a theatrical device whose function was to express "mood, tone, and atmosphere" and whose contribution was "to respond, witness, compare, draw morals, make public, to try to make sense," the chorus gradually shared responsibility for delivering pieces of the narrative [Barthes 1977, 1985; Bates 1961; J. R. Brown 1995].

In Sophocles's *Oedipus at Colonus* [Fagles 1982], the chorus alternate between singing as a collective and individually. At first a leader emerges from the frightened group to greet the dying man, but then the chorus moan together as Oedipus and his children discuss the terrible prophecy that the brothers Polyneices and Eteocles will kill one another. As Oedipus approaches death and thunder signifies Zeus's presence, the chorus break apart. Individual chorus members voice their concern: one exclaims that the "skies are crashing"; another sings of this "marvel flung by the hand of god"; another shrieks of "hair-bristling, heart-racing terror"; another wonders frightfully what will happen next;

still another predicts that something awful will happen; and another simply whines, "Oh great sky, oh god!". As Oedipus says goodbye to his children, chorus members again amplify the drama with individual comments: one shudders from the thunder and lightning now surrounding them; another cries for mercy; another pleads Zeus not to let disaster befall him because he looked at a "man accurst"; and another echoes the selfish plea. Finally, as Oedipus leaves this world, the chorus reconvene and augment the narration by inviting Theseus to receive the dying man's blessing.

In *Antigone*, also by Sophocles [Corrigan 1965], the chorus again speak both singly and collectively as they narrate and offer commentary on the moral dilemma. However, their change of view through the course of the drama suggests the sort of character development that we would normally expect an individual actor to represent. The chorus of elders begin by describing the conflict between Oedipus's sons. The elders side with Creon in his decree that Eteocles should receive a decent burial but Polyneices should not. Creon is king, they declare, and his word should be the respected the law of the land. Here the chorus speak separately but hold one view. Even as they assert it, though, they acknowledge the complexity of the issue by reserving the possibility that their view could be flawed, affected by vulnerabilities of old age. Indeed, they waver as it becomes increasingly clear that both Antigone's and Creon's arguments are substantive.

As the drama plays out, the chorus offer comments both illuminatory and cliché: the hand of God brings about Polyneices's illicit burial; man should obey laws; everyone can learn. When Antigone persists in resisting Creon's edict, the chorus declare that she is like her father and offer evidence by describing prior events from the tale of Oedipus. Realizing that Creon is behaving rashly, they still side with him but again allow that old age may predispose them to a certain foolishness. They begin cultivating a way out of their stated position by articulating two aspects of the dilemma: "You acted for the good," they tell Antigone," but disobeyed the law." "What moral law have I disobeyed?" she asks.

The Law, it seems, may have more than one face. Originally siding with human law, the chorus now understand and respect the law of the gods. They urge Creon to relinquish his decree, but it is too late. Faced with sweeping tragedy, the elders condemn Creon and manage to frame the situation in terms of themselves – they, like Creon, have changed through the horrific events: "proud men in old age learn to be wise." They have managed to both reverse and maintain their original position. Still advocating compliance with Law, they emerge on the side of Good. Now, their age no longer contributes to frailty, but to wisdom.

Thus the chorus may personify, clarify, magnify, subdue, transpose, interpret, retell, frame, or give perspective to the narrative action. Chorus members may fill in "holes" in the narrative, offer commentary, foreshadow the action, and reflect the action by re-enacting it in other modalities. The chorus may act as an intervening layer that protects the audience from incidents too horrifying to directly experience, such as the multiple

deaths in *Antigone* [Friedlander & Strohecker 1995]. In that awful tale, the chorus are the only survivors.

Rosa Parks and Preludes to the Montgomery Bus Boycott

United States history offers a latter-day Antigone in the figure of Rosa Parks, a Black woman who refused to give her seat to a White man on a segregated public bus.[5] The time was 1955, the place was Montgomery, Alabama, and the event became a milestone in the American Civil Rights Movement.

One widely distributed textbook version of this story describes Parks, who was 41 years old at the time, as an aging woman who was so tired after a long day at work that she didn't want to give up her seat [Kohl 1995; Mayer 1995]. This telling neutralizes her act of civil disobedience. Parks has addressed the misrepresentation by asserting, "The only tired I was, was tired of giving in" [Parks & Haskins]. We emphasize her statement through the title of our retelling, *Tired of Giving In* (TOGI) [Brooks 1996; Strohecker 1996; Strohecker 1997 a, b].

Some versions of the story do acknowledge Parks for her courageous act but over-emphasize its individual nature. Many members of Montgomery's Black community had experienced discrimination, particularly on public transportation, and many had resisted in one way or another. The community was well organized through a network of churches and the efforts of dedicated activists. By 1955, members of the NAACP and other local groups were waiting for a legal case that could serve as a test of the segregation laws.[6] They nearly found one several months before the Parks incident, when a teenaged girl named Claudette Colvin was arrested for the same offense. However, because Colvin had resisted the police and was expecting a child out of wedlock, community strategists felt that her case would not be able to withstand the publicity associated with a trial of such importance [Blackside 1987; Robinson 1987]. They decided to wait.

Some accounts acknowledge this bit of strategy while emphasizing the fact that Parks was secretary of the local NAACP and worked closely with its president, E. D. Nixon. It was Nixon who had decided not to pursue the Colvin case. These accounts suggest that Parks's resistance on December 1 was planned, as Nixon and others felt that the time had come to challenge Jim Crow,[7] and that Rosa Parks was a strong character who could withstand public scrutiny and represent the Black community well. Such accounts laud Parks but diminish her remarkable act of bravery. As a community activist, Parks was better prepared than most to follow through with such an act. She must have realized the likelihood of being arrested when she refused to give up her bus seat. Nevertheless, when

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[5] Whereas current vernacular favors identification of groups by culture or nationality of origin, our designations of racial groups reflect usage during the time of the Civil Rights Movement.
[6] NAACP stands for "National Association for the Advancement of Colored People."
[7] "Jim Crow" is a term for the system of segregation laws.

the situation occurred – and it occurred spontaneously [Parks & Haskins 1992] – she handled it with quick thinking, dignity, and courage.

Our account attempts both to extol Parks as an individual and to explicate the power that had built up in the community through so many years of abuse, organization, and resistance. Ours is a story not just of one brave individual, but of many, who came to realize that by acting together they could change their world. Thus the TOGI chorus include members of 1955 Montgomery's Black and White communities, who are struggling with the issue of segregation. These are the members of Chorus Present. There are also two other groups in the TOGI chorus. Members of Chorus Past are Africans taken as slaves during colonial times, who look to the 1955 events and wonder how they could ever come to be. Members of Chorus Future are young urban dwellers of today, who look to the 1955 events and wonder whether anything has really changed.[8]

Chorus Past	Chorus Present	Chorus Future
Akpan Tebogo Udo	Winona Isaac Beulah SallyJo Jacob Bud	Latisha Natoya Ana Jace Checker

TOGI's characters include notable members of the Black and White communities. The portrayals of Rosa Parks, Claudette Colvin, E. D. Nixon, Martin Luther King, Jr., Jo Ann Robinson (president of the Women's Political Council), and Fred Gray (attorney for Rosa Parks and later, for the Montgomery Bus Boycott), derive from autobiographies and other accounts of the boycott and related events. Sometimes the script incorporates direct quotations from such sources [Blackside1987; R. H. Brown 1995; Gray 1995; Hine 1990; King 1958; Levine 1993; Osborne 1968; Parks & Haskins 1992; Parks & Reed 1994; Raines 1977; Ransford 1971; Smith 1964]. Other characters are more fictionalized, though they also are based on accounts of and by people in Montgomery at the time: Tacky Gayle (mayor of Montgomery), Clantello Bagley (manager of the City Bus Lines), J. P. Blake (the bus driver who had Rosa Parks arrested), and the arresting officers.

Parks   Colvin   Nixon   King   Robinson   Gray   Gayle   Bagley   Blake   arresting officers

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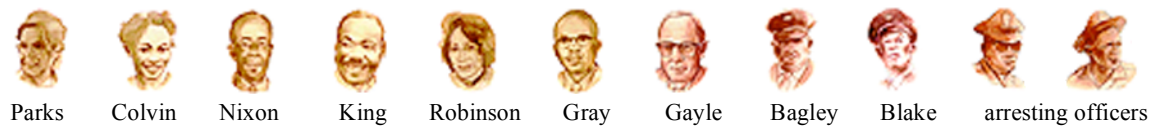
[8] Illustrations in this paper are adapted from those developed by Steven Alexander for the TOGI prototype.

TOGI Narrative Structure

People often say that a story "unfolds," and that is the way we frame interactions with TOGI. By selecting areas of images and querying characters and chorus members, viewers unfold details of plot and character. The story is revealed through six "folds":

Fold 0: Viewers do not have to interact with TOGI. Viewers who let it play on its own hear the "default" story, told by a chorus member who sees the events from today's perspective. She thinks that Parks and others who participated in the Montgomery Bus Boycott set an example that remains relevant. The story proceeds through four scenes, each opening with her narration. Between the scenes are refrains in which chorus members chant and effect transitions.

Fold 1: Clicking on part of a scene reveals a particular set of characters and chorus members. The default story is put "on hold" as the revealed characters begin talking with each other, unfolding additional aspects of the story. If the viewer interacts no further, the characters' dialog plays out. Then the program returns to the main story, roughly to the point at which the viewer intervened. The program continues in the mode of Fold 0.

Fold 2: As the Fold 1 characters' dialog proceeds, the viewer may click on one or more of the chorus members. These chorus members interject comments within the dialog. One of our concerns in scriptwriting was to key the meaning of each potential choral interjection to a corresponding chunk of the characters' dialog. If the viewer activates more than one chorus member, the multiple comments play out in queue. Then the Fold 1 dialog resumes. The tonal effect is colorful, a bit like talk radio, and the visual presentation in this early prototype is like an illustrated storybook. Illustrations come and go, superimposed over the background of the pictorial scene. Some of the illustrations are motion pictures.

Fold 3: If, during the Fold 1 dialog, the viewer clicks on a character rather than a chorus member, the character turns to the chorus member whom the viewer has queried most frequently up to that point in the program. The character and chorus member exchange remarks relevant to the current dialog, and after their remarks play out, the dialog resumes.

Fold 4: One chorus member reveals a "graffiti wall" associated with the scene. Here the program is most true to the chorus metaphor: by adding his or her own comments, the viewer in effect joins the chorus. In this early prototype the comments are typed; ideally they would be spoken. Comments are marked by glyphs that subsequent viewers can query to see the text that other viewers have added.

Fold 5: Another chorus member reveals lists of references citing sources of information and media used in the presentation.

We have numbered the folds for purposes of designation, but the folds are not purely sequential. Folds 1, 4, and 5 can occur at any time within the frame established by Fold 0. Folds 2 and 3 stem from Fold 1.

The following series of illustrations represents TOGI's process of narrative unfolding.

TOGI opens as the chorus members introduce themselves:[9]

Chorus Past: Udo, Tebogo, and Akpan are taken as slaves from their African home. Udo is resigned to being a captive; Tebogo mourns; Akpan remains proud.

Chorus Present: Beulah, Jonah, Winona, and Isaac are Black "South'ners, just gettin' by." Beulah doesn't like their segregated way of life, but is accustomed to it and fears change. Jonah has internalized the system; he knows his place. Winona and Isaac resist. Bud is Jonah's White counterpart: he accepts segregation. SallyJo, Beulah's White counterpart, is acquiescent.

Chorus Future: Natoya doesn't understand how the events of 1955 are relevant to him. Latisha thinks they resulted in sweeping changes and wants to perpetuate the ideals. Ana thinks the events amounted to a ripple that had little effect on today's realities. Through Jace, users can add their own comments in the form of graffiti. Checker reveals bibliographic sources.
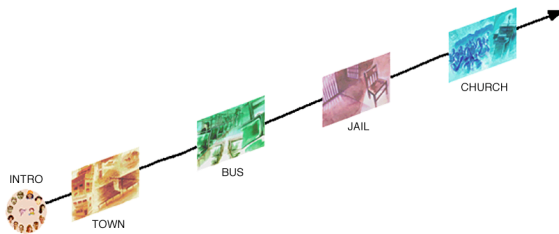
Viewers can watch the introduction or skip to the first scene of the story. The narrative proceeds through four scenes: the *TOWN* of Montgomery, the *BUS* on which Rosa Parks is arrested, the *JAIL* cell to which she is taken, and the Holt Street *CHURCH*, where the boycotters congregate.
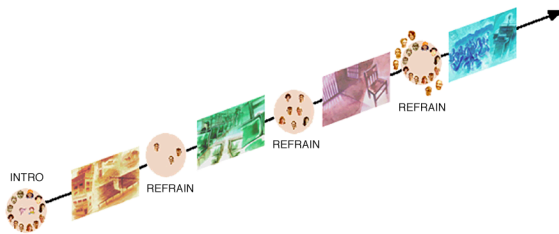
Alternating with the scenes are refrains in which chorus members chant about moments in the story. The final refrain also acts as a transition: characters join chorus members in describing how activists organized the boycott's first day.

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[9] See "Choral Perspectives, States, and Feedback to the Dynamic Presentation" and "Lessons from the Prototype" for discussions of our characterizations of the various chorus members.
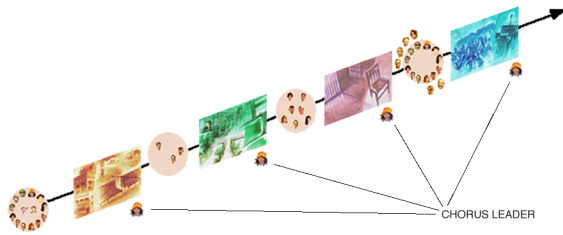
With or without interaction, the program presents this basic story (Fold 0). As each new scene appears, the chorus leader (Latisha, the optimistic member of Chorus Future) synopsizes:

👤 *Montgomery was a Southern town like any other in 1955. Well, it was really two towns, in a way, "Black" and "White" – or "Colored" and "White," as people called the separate facilities for African Americans and European Americans. These communities were separate, but not equal – far from equal. Segregation was enforced by law and by practice. Violators could be shunned, arrested, beaten, even lynched. One day, as Martin Luther King, Jr., later said, "a lady by the name of Rosa Parks decided she wasn't gonna take it anymore."*

👤 *If Rosa had seen who the driver was, she wouldn't even have gotten on that bus. She'd had a run-in with him twelve years earlier. He'd used his authority to throw her off a bus when she wouldn't re-enter through the back door after paying her fare. Just about every Black person in Montgomery had had a similar experience, or knew someone who had. So on December first, when the bus got crowded and the driver told her to give her seat to a White man, Rosa wouldn't do it. ... The driver told her to get up, and when she wouldn't, the cops came and took her away.*

👤 *There she was – a prominent, reputable member of the Black community, in jail. Rosa knew better than most what that could mean. In the South, people sometimes "disappeared" in jail, never to be heard from again. Fortunately, Rosa's family and friends were able to answer her call for help. It was the first of many calls to be made that night, and during next few days. Rosa's arrest was the spark the Black community had been waiting for. They called for a boycott of the city buses on December fifth, the day of Rosa's trial.*

👤 *The organizers had no idea that the one-day boycott would be such a success. Almost everyone had stayed off the buses. They'd stayed home, taken a cab, walked or found a ride, but they had not ridden the buses on December fifth. That meant the buses were virtually empty, because most of the people who relied on public transit were Black. They'd shown the city of Montgomery, and themselves, that they had power – power as a community, and as individuals within a community. And they had the power to go further.*
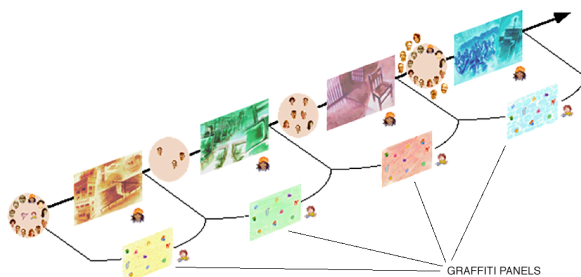

As the story proceeds, viewers can add comments at any time through Jace, a graffiti artist (Fold 4). He reveals a panel displaying some "spray-painted" glyphs. Each glyph holds a comment that another viewer has entered. Viewers can browse through these comments and/or enter their own by clicking a blank part of the panel and typing a new comment or comments.
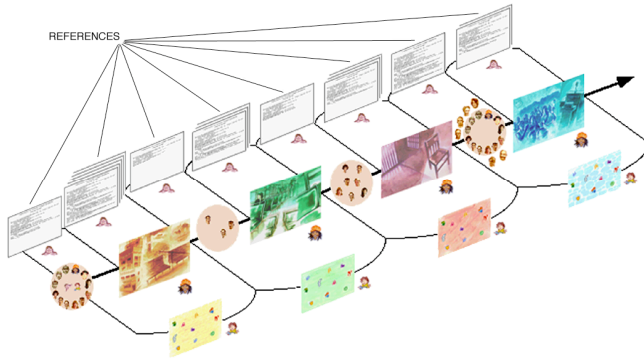
Also at any time, viewers can call upon another member of chorus future, Checker, to reveal listings of books, articles, videos, etc., which served as references for the script and/or were sources of illustrations for the presentation (Fold 5).
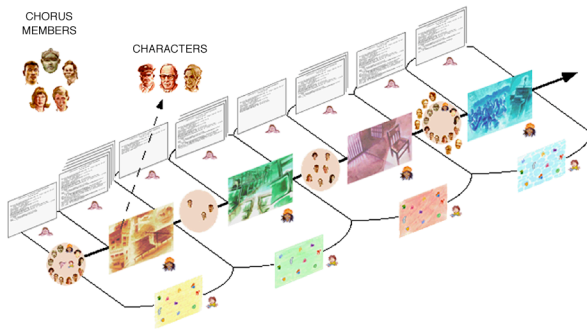
The program proceeds from the introduction into the first scene, which characterizes the town of Montgomery. Latisha says her part, and the viewer can learn more by clicking an area of the scene. An associated set of characters and chorus members appears (Fold 1).
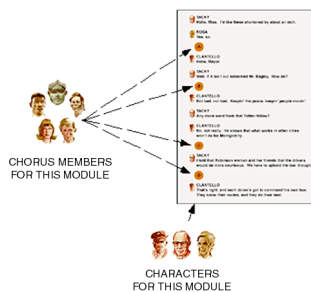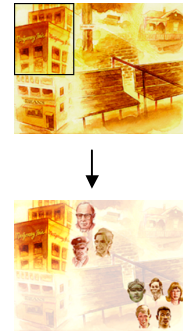
The characters begin speaking, engaging in a pre-recorded dialog. The viewer can activate any of the chorus members to hear pertinent comments (Fold 2). The dialog continues to a point at which the comment can be interspersed, then the comment plays out, and then the dialog resumes.

The pace of this form of interaction is calm and thought-provoking, since the dialog and interspersed comments are spoken and play out in real time. If the viewer activates several chorus members quickly, one immediately after the other, they deliver their remarks one by one until the queue plays out.

Then the characters' dialog picks up again and further choral interspersals become possible. As the dialog and comments play, still and moving images supplement the choral perspectives. Images pertain to the speeches and/or their historical context.
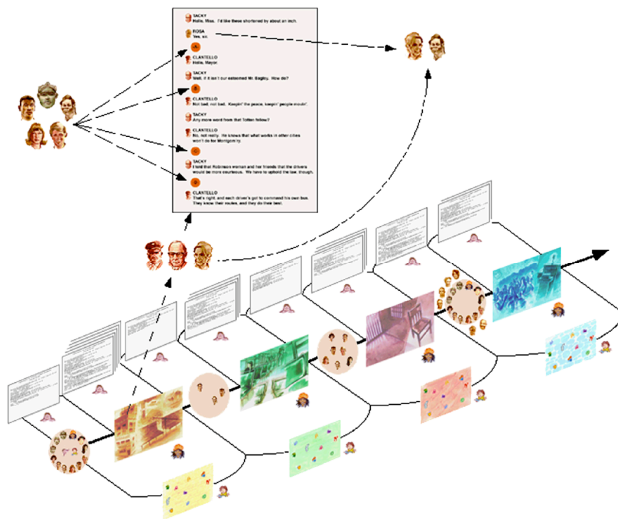
If the viewer activates a character instead of a chorus member, the current dialog and choral queue are "put on hold." The character addresses the most frequently queried of the module's active chorus members. This chorus member replies briefly (Fold 3). Then the program continues playing out the choral queue and Fold 2 dialog.

TOWN has five modules: the Parks home; the Montgomery Fair Department Store, where Rosa Parks worked as a seamstress; a "Whites only" city park; the lunch counter at Dean's Drug Store, where Black citizens gathered; and a segregated bus stop.

BUS has three modules, in which people board the crowded bus after a long day's work, the driver demands that Rosa Parks give up her seat to a White man, and two policemen arrest her for refusing.

JAIL has three modules, in which Rosa Parks is fingerprinted, waits in the frightening cell, and is released when her friends produce bail.

CHURCH has two modules: the pulpit from which Black community members and the young Dr. Martin Luther King, Jr., deliver speeches; and the congregation of encouraged boycotters.
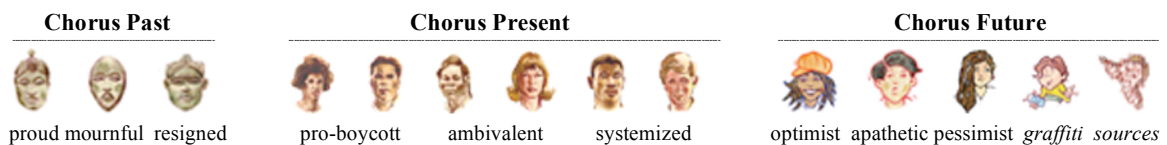
Choral Perspectives, States, and Feedback to the Presentation

Software for personal computers uses a "windows" metaphor to convey a sense of looking through the interface to information. Although more and more people work with this metaphor, many still experience the conventional monitor and interface setup as a

barrier rather than a gateway. To many, computers seem inaccessible and opaque. We sought a metaphor for storytelling that would acknowledge the boundary between users and computers but allow for a sense of its permeability.

The chorus in ancient Greek plays acts as a personified, permeable layer between audience and action. As theater audiences rely on the chorus to shed light on intricacies of Greek dramas, we hoped software-users-as-narrative-interactors would allow the chorus to help explicate stories like TOGI. We had hoped to push this idea so far that viewers could transcend the traditionally passive roles of "audience" or "viewer" and, in effect, join the chorus. We realized this aim only partially in the prototype described here, but the idea did help in forming algorithms that use information about viewers' interactions to control aspects of the presentation.

In preparing our version of the Rosa Parks story, we wanted first and foremost to tell the complex story fairly and accurately. Of course, in any matter of historical account, "fairness" and "accuracy" are a function of point of view. The best one can do is try to represent the many, often conflicting, perspectives. We studied reports in newspapers and history texts in addition to accounts by Rosa Parks [1992, 1994], Martin Luther King, Jr. [1958], Fred Gray [1995], and JoAnn Robinson [1987]. These autobiographical narratives helped us to represent the writers (and others) as characters in TOGI, and to develop "attitudes" for the chorus members. In creating the chorus members, we included a range of views pertinent to the themes of desegregation and civil rights. This range grounded the scriptwriting and provided a framework for characterizing viewer interactions.

Chorus Past			**Chorus Present**						**Chorus Future**				
proud	mournful	resigned		pro-boycott		ambivalent		systemized		optimist	apathetic	pessimist	*graffiti* *sources*

Members of TOGI's Chorus Past respond differently to enslavement. One remains strong and proud; another wails and mourns; another resigns himself to angry acceptance. Members of Chorus Present include those eager for change and ready to boycott Montgomery's buses, those whose ability to function in any prevailing lifestyle leads to problematic ambivalence, and those whose acceptance of White supremacy and the system of segregation is so deep that it affects their self-image as well as their behavior. Members of Chorus Future are young people of today grappling with the legacy of the Civil Rights Movement. One takes an optimistic view, hoping that the changes are lasting and that social awareness will continue in the direction of human rights; another sees events related to the Montgomery Bus Boycott and the Civil Rights Movement as irrelevant to his own experience; and another takes a pessimistic view, discouraged by today's struggles for parity and dignity among members of American subcultures. Two other members of Chorus Future enable means of supplementing the narrative: one accesses hypertext-style "graffiti walls" on which viewers can add their own comments,
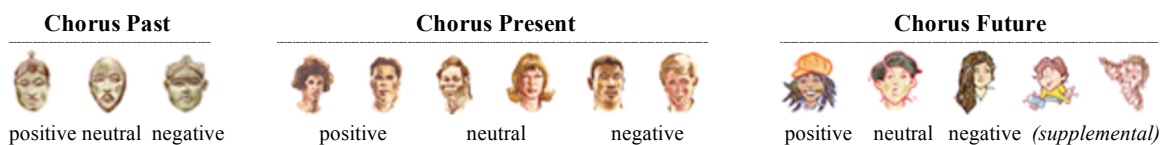
and another accesses lists of bibliographic sources that we consulted in developing the script and preparing the visual presentation.

We struggled with how best to represent and balance race, gender, and culture in the three sections of the chorus. In our absorption with showing varying responses to enslavement, for example, we omitted another representation that would have been appropriate for the Chorus Past, that of a White slave trader. But in other cases we were able to incorporate a more complete picture. For example, our characterization of SallyJo as "ambivalent" enabled allusion to a role that many White women played in the Montgomery Bus Boycott. Some were genuine sympathizers, and others just wanted their housemaids to continue working, but for whatever reasons many surreptitiously offered car rides to pedestrian boycotters. SallyJo waffles but ultimately changes her attitude during the presentation, joining the ranks of the pro-boycotters. Similarly, our characterization of Jonah as "systemized" enables a more fluid treatment of his personage: at the critical moment just before Rosa Parks is arrested, he flees the bus (as people sometimes did under such circumstances).

The process of narrative unfolding is variable and unpredictable, and we wanted to ensure that personas of both characters and chorus members would emerge in any given viewing. Therefore we exaggerated the characterizations, and in the process became more aware of our own views. We struggled with the realization that we were engaged in a paradoxical effort: one of our grander, moralistic aims was to produce a media artifact that would help to nullify prejudice by promoting historical and political awareness. Yet, in an attempt to illustrate people's struggles within the context of the artifact, we needed to reduce the characters to simple, clearly defined personas whose views and actions would be communicable through the narrow bandwidth of the interface, with its hand-drawn pictures and brief recorded speeches. In the end, despite our good intentions, we sometimes pigeon-holed people in much the same way that fuels prejudice on the larger, societal scale. It's clear from experiences with viewers who tried the prototype that our characterizations need to be further developed.[9]

We also grappled with the realization that it would be impossible for us to tell this or any story without our own perspective influencing the telling. Ultimately we embodied our view through the voice of Latisha, the optimistic member of Chorus Future, who narrates the default story. In this way she is similar to the chorus leader in ancient Greek plays.

To coordinate among the choral perspectives, we settled on coarse designations according to chorus members' positions with regard to the bus boycott and broader themes of the story:

Chorus Past — positive neutral negative

Chorus Present — positive neutral negative

Chorus Future — positive neutral negative *(supplemental)*

[9] See "Lessons from the Prototype" and "Further Work."

The designations "positive," "neutral," and "negative" are too imprecise to have helped in scriptwriting, but establishing these common categories among the choral sections helped us to form a basis for tracking viewer interactions and using them to tailor each presentation.

SCRIPT FOR
CHARACTER DIALOG
IN THIS MODULE

CHARACTERS
IN THIS MODULE

SCENE WITH
SEVERAL MODULES
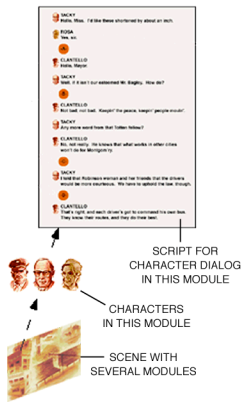
Aspects of TOGI are invariable, such as the default story (Fold 0) and the characters' dialogs (Fold 1). However, viewers hear the dialogs only by activating the modules that contain them. Therefore, in a given viewing, certain dialogs may or may not occur.

ACTIVATED MODULE WITH
ASSOCIATED CHARACTERS
AND RELEVANT
CHORUS MEMBERS

When the viewer activates a module, the same set of characters always appears, and these characters engage in the same dialog each time. The viewer can simply let the dialog play without interacting. However, much of TOGI's texture and variability come through the decisions of whether to interact further, as the dialog proceeds, and which characters or chorus members to select when interacting (Folds 1 and 2).
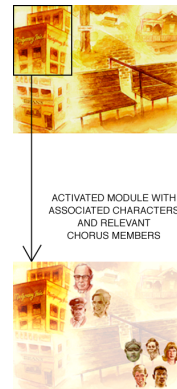
Although the characters are fixed for each module, the chorus members are not. We declared certain chorus members as being "relevant" for each module. For example, Akpan, Beulah, SallyJo, Bud, and Jonah are the only chorus members who are declared relevant for the Montgomery Fair Department Store module. Similarly, Akpan, Tebogo, and Udo are the only relevant chorus members associated with the arrest and imprisonment of Rosa Parks. By emphasizing their presence, we acknowledged her description of the sense that her ancestors were "with" her during these experiences [Parks & Haskins 1992].

Relevant chorus members may or may not be available – that is, visible and eligible for query – in a given playout of a selected module. The program usually makes available only some of the relevant chorus members. It determines the available chorus members based on selections the viewer has made up to that point. Thus, each time there is a question about how to present an aspect of the story, the algorithm makes the decision based on a history of the overall presentation.

As TOGI plays and the viewer interacts, the program tallies the number of times each chorus member is queried. A second tally tracks the viewer's interest in a given perspective (positive, neutral, or negative), based on the number of associated with that perspective. We called the data structures that hold this information "module maps."

When the viewer activates a new module, the program determines which of the module's relevant chorus members to make available. It focuses on those seen less often than

others in the overall presentation. Less-seen chorus members, and their attitudinal counterparts in other choral sections, have a greater chance of being available for interactions. In this way the program tries to balance perspectives offered to the viewer. If a viewer continuously queries a chorus member who speaks against the boycott, for example, the program is likely to make available a chorus member who speaks for it (and vice-versa).

We attempted to convey some of this process through the interface. When a module is opened, and as it plays, its associated chorus members are represented in varying states:

Inactive; relevant but not available for this module

Available but not yet activated

Activated; waiting to speak

Speaking

If a chorus member is relevant for the module but the program has not made it available for this unfolding, the chorus member appears but cannot be activated. It is "inactive." If a chorus member is available, the viewer can query it at any time during the characters' dialog. When a chorus member is activated, it may not be able to speak immediately; it may need to wait for the appropriate pause within the characters' dialog or for other chorus members to complete their interjections. When a chorus member does speak, it appears at full size and in full color.

The history of interactions helps ensure access to a full range of views. We used this real-time variability, in conjunction with the programmatic variability within the Folds, to create a rich story system. Thus TOGI is best experienced through multiple viewings and comparative discussion.

Lessons from the Prototype

Our challenge was to use interactivity to bring people into social and psychological conditions resembling those of the people who grappled with views and events in the Rosa Parks story. Our approach was to develop a research prototype of an application that could be described as educational. Nevertheless, there were prohibitive costs associated with using the archival photographs and documentary footage most appropriate to our story. Therefore, in deference to copyrights, budgets, and schedules, we relied mainly on our own original drawings, photos, and videos for the TOGI prototype. While these representations were not ideal, they helped us to shape a sketch that enabled realization and critique of nascent ideas about using the chorus as a model for interaction with computational narratives.

Many refinements would be needed if TOGI or a similar narrative were developed for distribution. However, what we learned from the initial prototype could benefit next-stage implementations of TOGI as well as other narratives using the chorus model. The lessons also point to general processes for production of interactive narratives. Here we summarize details from informal usage trials.

Improving the TOGI Prototype

Viewers of the current prototype learn several meanings of clicking as they activate modules, characters, and chorus members. In the early prototype there is sometimes a delay between a click and its result, and the overall pace also varies with the alternation of interactive scenes and non-interactive refrains.

Pacing

The pacing for a piece like TOGI should be contemplative, though the platform on which we implemented the initial prototype exaggerates this property.[10] Nevertheless, our design included some built-in delays. When a chorus member is activated, for example, it must wait for the end of a corresponding chunk of characters' dialog before the choral comment can be played. The chorus member must also wait if other chorus members are in queue to deliver their comments: the first-clicked have priority. On the other hand, if a character is activated, the viewer doesn't have to wait to hear the character's interjection. The program interrupts all pending processes and jumps immediately to Fold 3, delivering both the character's statement and a corresponding chorus member's reply. We are rethinking this design decision. If the character waited, as chorus members do, for all pending processes to play out before delivering a speech, the viewer may develop a stronger sense that the program behaves consistently and predictably. Furthermore, some kind of interface signalling system should display the sequence of clicks and speeches to be delivered so that the reasons for delays become clear.

The decision to provide for interactions within scenes but not refrains makes sense in terms of the structure of ancient Greek plays: refrains tended to be reserved for choral chants. However, we now realize that this alternation also requires fine-grained signalling via the interface.[11] Changing the cursor could be one such signal, but more significant changes are also needed in the representations of characters and chorus members (see below).

Non-interactivity is acceptable in the first two refrains but problematic in the final refrain. All of the refrains amplify characters' feelings and effects of events, but the final refrain also furthers the plot. This refrain is therefore significantly longer than the others. The unevenness in the overall program becomes unsettling, and the duration of the refrain becomes too long. While the refrain's narrative role is appropriate as a choral function, but the overall tempo should be more even.

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[10] We used a Macintosh Quadra running ProGraph and an associated set of media tools, Animation Solutions. We believe that this platform afforded us more flexibility than Director would have. However, at the time of this writing, available systems well surpass this platform in speed and flexibility. Mtropolis was an interim candidate, but as Java develops further it may be preferable for future implementations. The scene- and person-based organization of the program lends itself to an object-oriented structure.
[11] See "Feedback through the Interface."

The story is told mainly through audio as characters and chorus members narrate and converse. We learned that a reasonable listening "chunk" corresponds to a line or two of script.[12] Longer spoken parts might work if the viewer had greater control over the presentation and could stop speeches. However, we feel that keeping the tempo relatively even is preferable to providing for such interruptions.

The number of interactive modules in a scene can affect the program's overall pace. Many viewers like to explore each module, so having about the same number of modules in each scene can help the story progress evenly.

In this prototype, sequences of still images appear as the modules and character dialogs unfold. We found that these visual playouts work best at a brisk pace, preferably complementing the rhythm of the voices. Moving images work best as brief clips.

Structure and Navigation

We were so determined to keep the basic story intact that we provided primarily for one-way movement through the narrative. The viewer goes through the scenes in sequence: first Town, then Bus, then Jail, then Church. (Rosa Parks must be arrested before the boycott begins.) However, there is some leeway within each scene: the viewer can visit the interactive modules in any order.

This compromise works well for Town and Church, but questionably well for Bus and Jail. Perhaps this is because mood is most important in Town and Church, but Bus and Jail keep the story moving. In the current Bus scene, depending on which modules the viewer activates, it's possible for a viewer to hear Parks being arrested before the driver asks her to give up her seat. In Jail, it's possible for her to be bailed out before she is fingerprinted. One could justify this sort of looseness in terms of the viewer's processes of sense-making within the coarse parameters of the scenes. However that strategy might work best if it pertained consistently to mood or story, or if the viewer could move freely back and forth between the scenes, assuming more overall responsibility for construction of the narrative. In any case, the chorus leader's narration of the main story provides a chronological framework that enables viewers to construct a proper sense of events.

As viewers experimented with the prototype, we saw that we needn't have maintained the overall directionality so staunchly. Most viewers want to return to an earlier point in order to review or to experiment with different interaction possibilities. Their comments suggest that the underlying narrative structure can support continuity despite a high degree of navigational control and variable access to story details. In the genre of the current prototype, menus would be a natural mechanism for revisiting scenes, repeating speeches, etc. However, the program might then become more like a reference tool. The balance between reference tool and "movie" continues to be a topic for experimentation in the realm of computational nonfiction.

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[12] The script includes the narration and refrains for Fold 0, characters' dialogs for Fold 1, all possible choral interjections for Fold 2, and choral/character exchanges for Fold 3.

Characterizations and Representations

The story is sufficiently complex that even twelve chorus members and three categories of chronological perspective were insufficient to capture the totality of influences leading to the historic events in Montgomery. Furthermore, viewers wanted stronger characterizations and more complete representations for the included categories and voices. Viewers suggested that we should modify the Chorus Past, for example, by adding a White slave trader and a stronger, more resistant Akpan. Similarly, the script needs to reflect deeper, more understandable profiles of the characters and the relationships between them.

We used visual placeholders to represent characters and chorus members, who appear simply as cameo portraits on backgrounds associated with the scenes and refrains. We varied color and theme to differentiate characters from chorus members and to distinguish the Past, Present, and Future sections of the chorus. For example, members of Chorus Past appear as African masks, and members of Chorus Future look like members of today's urban "hip-hop" culture. We also varied size to differentiate characters from chorus members and to mark the changing choral states within each module. However, the illustrative style is the same for all, and the overall effect is to have many "disembodied heads," as one viewer put it, dotting the landscape of the interface. Clearly this treatment needs to be rethought. Another goal of redesigning the visual treatment should be to improve the signalling system so that viewers better understand the nature and effects of their interactions.

Alternative representations could be animations, full-body forms, video clips, or three-dimensional figures, depending on the platform and overall redesign. Differentiations need to help distinguish the players, choral states, affinities between members of different choral sections (such as the "neutral" acquiescent members of Chorus Present and the mourner of Chorus Past), and the changing possibilities for interaction as the scenes and refrains alternate.

Dynamic figures portraying characters and chorus members could provide greater range for communicating changes of state. However, the existing static cameo portraits do allow a certain economy of representation, and they could be further developed as a system of signals. Tufte [1990] describes the technique of "small multiples," which help to establish a context by showing variations on a pictorial theme. One option for the redesign would be to use this technique by showing all the choral states simultaneously, with a visual distinguisher such as highlighting or enlargement indicating state changes as the module plays.

An additional way to distinguish between and among characters and chorus members is through sound: professional voices would certainly help, and the treatment of the chorus could be more musical. Furthermore, an immediate spoken response could supplement the visual feedback when a viewer activates a character or chorus member. We recorded

back-channel utterances for this purpose (such as "uh-huh," "amen," "okay," etc.), but time prevented us from incorporating them into the current implementation.

Such considerations can help to improve the communicative power of the interface. A deeper problem is in communicating that interactions have a long-term effect. Indicating the frequency of a given chorus member's interventions should be another consideration for the redesign. Furthermore, some visualization of the currently implicit module maps may help viewers to appreciate the effects of their interactions, and may help to encourage repeat viewings.

Production Processes for Interactive Narratives

We were simultaneously developing a story, a narrative structure, an interaction strategy, and a production methodology. We identified coarse phases of production that could be roughly correlated to pre-production, production, and post-production phases of traditional movie-making. However, perhaps inevitably, we found ourselves considering and expending effort on each sub-task throughout the course of the overall project. Nevertheless we found these rough distinctions useful as we developed schedules and other projections:

Pre-production	conceptual organization
	develop narrative structure and model of unfolding
	identify characters, chorus members, and choral perspectives
	develop design and presentation approach
	identify computational platform configuration
	write script
Production	develop original artwork and music
	collect other images and sounds
	record script, refining wording as necessary
	record audio
Post-production	digitize and edit narration, images, sounds
	make object structures
	identify methods
	prepare digitized material as manipulable objects for the program
	incorporate media elements within the program
Testing	refine program and presentation based on usage trials

Further Work

There are two ways in which the work described here could be extended. One is to refine the TOGI prototype on a similar platform (a point-and-click multimedia system). Another is to experiment with a networked multiuser platform, which may be the medium in which to best realize the potential of the chorus as a model for viewer interactions.

While capabilities of these two platforms differ in obvious ways, they present similar challenges in presenting the story through multiple channels of speech, music, still images, and moving images. Both platforms pose the questions: What kinds of information can the viewer add? How does it get into the computer? How does the program incorporate the information so that it affects the ongoing presentation?

Here we outline reformulations of the existing prototype, and longer-term research involved in developing stories like TOGI as multiuser interactive systems.

Directions for Refining the Existing TOGI Prototype[10]

Our idea was to bring viewers into a story by positioning them as members of a chorus, situated between the audience and the action. We partially achieved this aim in TOGI. The viewer becomes both audience-like and chorus-like. The viewer sometimes watches and sometimes interacts, and more than one manner of interaction is possible. Most interactions occur by querying pre-programmed actors (characters) and chorus members. Viewers are the most chorus-like, however, when adding their own non-scripted comments to the "graffiti walls." Adding spoken comments would be more natural than typing, and this is one way in which the existing prototype should be modified. Another modification having to do with speech input and output would be coordinating the play of simultaneous speeches when several chorus members have been queried, rather than using a queue to sequence their delivery. Automatic volume adjustments and track dissolves would be among the considerations.

As described in the preceding section, lessons learned from use of the current prototype indicate the need for improvements having to do with navigation, representation, and treatment of imagery and other aspects of presentation. We also learned that while it is appropriate to devote the refrains to the chorus, we needn't have excluded participation by the viewer in these segments; on the contrary, the viewer-as-chorus model could be well served by bringing viewers into the refrains. Furthermore, maintaining the capability to interact throughout the program would create a consistency that might boost the viewer's understanding of and confidence in the program.

TOGI is to a large extent a structural experiment. Variability in presentation results mainly from the viewer's decisions of when, what, and whom to activate, causing different images to appear and different speeches to be made. These differences effect degrees to which the characters and plot get developed. Interestingly, the programmatic variation introduced solely by viewer interactions could be enough to guarantee flexibility within the structure. However, we augmented this flux with a background algorithm that keeps a history of viewer interactions and uses it to refine the display and interaction possibilities. An interesting experiment would be to run the program with and without this algorithm, enabling comparison of the resulting presentations and viewer experiences. At one end of the spectrum is a purely structural experiment; the other

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[10] See "Lessons from the Prototype" for more detail.

points to a more agent-like model. In our current program the module map structure is a kind of agent. However, TOGI's emphasis on characters and chorus members suggests the possibility of a more persona-based strategy, in which characters' and chorus members' self-contained histories of activation could determine a more directorial role for them.

Directions for a Similar Experiment on a Multiuser Platform

Barthes [1985] describes the chorus as "the human collectivity confronting the event and seeking to understand it." The model is ideally suited for experiments on multiuser platforms. Several simultaneously present viewers could interact together, to unfold and comment on the story. Coordination and orchestration of their interactions would become a research issue, along with the issues of representing characters, chorus members, and opportunities for interaction.

Some experiments should include combinations of recorded dialog (from scripted players) and live dialog (from simultaneously present players). Other experiments should focus on coordinating contributions made at different times, some being live and others from previous sessions. In any case the difference in viewer experience would have to do with interacting *through* a chorus member vs. really *being* a chorus member. The role of the chorus leader would no doubt take on new significance, perhaps as a live editor or coordinator of viewer contributions.

Revisions of the machine learning algorithm may include coordinating contributions by simultaneously present users or decision-making based on cumulative use by many people. Again, instead of text, live and recorded speech would be preferable for the choral parts. Imagery could include animated 3D sequences and/or digital video, depending on the platform capabilities that augment the networking.

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TOGI has been described at the General Assembly on Multimedia Writing [Strohecker 1996], the ACM Multimedia conference [Brooks 1996], Stanford University [Friedlander 1996], the Women and the Art of Multimedia conference [Strohecker 1997], and the Designing Interactive Systems conference [Strohecker 1997]. The prototype has been demonstrated at Liverpool John Moore University's MediaActive conference [Strohecker 1996], the Prix Möbius conference (sponsored by UNESCO and the European Commission) [Strohecker 1996] and the Harvard University Graduate School of Design [Strohecker 1998]. The work is supported by MERL – A Mitsubishi Electric Research Laboratory, in Cambridge, Massachusetts, USA.

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