

# A Multi-Timeline Interface for Historical Newspapers

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Events may be best understood in the context of other events. We can call a set of related events a timeline, because of the temporal ordering. Even such timelines are best understood in the context of other timelines. To facilitate the exploration of a collection of timelines and events, a visualization tool has been developed that structures the user's browsing across events and timelines. In this model, each event is accompanied by a text description and links to related resources. In particular, this system provides a browsing interface for digitized historical newspapers.

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**General Terms:** Design, Human Factors.

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## 1. INTRODUCTION

Although we routinely refer to events in everyday speech, the nature and granularity of these events varies widely. At one point, we might refer to the construction of the Brooklyn Bridge as a single event and a moment later refer to it as composite of many events. To reflect these loose, but meaningful groupings of events we use several levels of description. These groups may be thought of as "eras" (e.g., Civil War Reconstruction) or "themes" (e.g., Supreme Court cases about Civil Rights). They could also be the set of events in a person's life or even an organization's life. For convenience we refer to all of these as "timelines".

Timelines are very commonly presented graphically devices for organizing sequences of events. Yet, surprisingly, are only a few systems have employed interactive timelines as a framework for user interfaces [1, 8]. A single timeline with no interactivity provides a limited amount of information about the order of events it includes but its usefulness is easily exhausted. On the other hand a truly comprehensive set of events could be bewildering. As suggested by [1], timelines can be used in several ways: to inform directly, to show context, and to provide contextual links. Here, we aim to be in the middle range, so we use scoping, limited detail, and a limited number of options to provide a flexible, but not overly broad, browsing environment. We do not model the causal associations among events explicitly but the grouping coupled with a user's general knowledge

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implicitly suggests causal associations.

## 2. DESIGN AND IMPLEMENTATION

As shown in Figure 1, the user has control over how many timelines are presented. The timelines are selected from scroll lists for either the "focus" space (right side) or the "context" space (left side).

In this example shown, the content is based on a brief essay on the Chinese Immigrant Experience in Brooklyn was prepared by LaCalle of the Brooklyn Public Library. The timeline used to summarize the Chinese Immigrant Experience in Brooklyn has been placed in the focus region. There are three other sets of events (American History, Brooklyn and New York History, and Brooklyn Bridge) have been selected for the context space. Although it is not apparent in the Figure 1 each of these timelines is displayed in a different color. Additional interface controls allow the user to limit the range of times displayed and to toggle between a simple ordering of the events (as shown in the Figure) and presentation of equal temporal intervals.

Furthermore, other materials such as news stories and images may be linked from each of the event descriptions. Within the next few years, a vast number of pages of historical newspapers will be digitized by the National Digital Newspaper Program (NDNP). Our multi-timeline browser can provide a visualization interface for accessing this material. Thus, we provided links from the essay on Chinese Immigration in Brooklyn to news articles from the *Brooklyn Daily Eagle Online* illustrating those points.

This environment may be thought of as providing "scaffolding" for the users. Principles of personalization and tutoring may be applied eventually to controlling the level of detail and the coordination of explanations across events. But, until such techniques prove effective the set of timelines will probably be authored much as textbooks are today. Like textbooks, they can be adjusted by the user's age and past experience with the interface. Indeed, consistency across entire curricula would be desirable. So, some of the timelines such as American History or the American Presidents may appear in combination with other the specialized sets such as Chinese Immigrant History in Brooklyn.

The interface was developed as a Java applet. The Timelines, Events, and Descriptions were stored by servlets on an Apache Tomcat web server. Although the explicit links were not made for this interface, it would be natural to employ the XML export of the event schemas in our Event Gazetteer [2].

## 3. FUTURE WORK AND CONCLUSION

Some historians object to an emphasis on dates when explaining history; they seem to prefer to focus on interacting trends or constraints. Others see history as illustrating



Figure 1: The multiple timelines can be viewed simultaneously. Descriptions of the events shown in the timelines can be selected and those, in turn, can point to other materials such as news articles describing the events.

the ways communities solve problems. While we feel that there are advantages to the clear temporal structure provided by the timelines and we did not model causal associations explicitly, causal associations can clearly provide additional additional support for understanding. Either of the approaches to causation described in [3, 5] could be adapted to show causal relationships among the events in the focus area.

As noted above, because events are central to news stories, it is natural to use this interface for browsing news stories. Potentially all the events in the news stories could be captured in detail (e.g. TimeML, [6]) and mapped back to the timelines. That is, the interface could provide a view centered on news articles rather than based on timelines. Such an interface will require metadata [4] and processing may facilitate search. Thus, research on “topic detection and tracking” which has been developed for contemporary newspapers [7] could be applied to historical newspapers. Indeed, a step toward the visualization of news topics was taken by Swan and Allan [9], but their emphasis was on the development of topic detection algorithms rather than the utility of the visualization for ordinary users. Again, the trick for a general purpose interface would be to provide enough structure so the user does not get lost in the complexity of the news articles.

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