Dynamic Visual Metaphors for News Story Abstractions

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Abstract

This paper describes a dynamic document genre for on-line news, specifically designed to support end users in both easily skimming news stories as well as reading them in-depth. Through careful analysis of the needs of on-line news readers, and understanding the opportunities and constraints of the computational medium, we set out to define characteristics of a document management environment which uses linguistically-intensive content analysis techniques to derive document abstractions usable as ‘zooming’ windows into and out of documents. The notion of flexible mediation between progressively richer, and more informative, layers of document content defines the core underlying characteristic of a dynamic document genre. We prototyped and deployed three examples of dynamic document viewers that characterize this new genre. The design incorporates a novel mix of: state-of-the-art linguistic analysis techniques that produces capsule document overviews, novel temporal typography techniques that allows us to dynamically change how these overviews are presented to the reader, specialized search and filter mechanisms to cul between relevant documents from the Web, and large screen displays to facilitate peripheral awareness of constantly changing news feeds.

1 Introduction

Genre is characterized by both form and content; it is defined by the content, i.e. journal article, text book, news story; and mediated by the form, i.e. typographic presentation, layout, etc. Interplay of form and content provides a framework for interpretation of the genre, thus enabling communication. For example, side-bars in text-books provide a consistent mechanism for an author to include more detailed information on a topic, without disturbing the flow of the regular text. A reader of a textbook on their part, knows that if they want a detailed example on a topic, they should look for a side-bar near where the topic is first mentioned in the main text. Used not only in textbooks, the side-bar is an example of a genre which makes use of different granularity of information to convey different levels of detail about something.

The development of a genre is driven by understanding the communicative needs and work practices of the community who will be using the genre [15], coupled with understanding the constraints and opportunities of the medium in which the genre is presented [6]. The recent growth of multimedia and communication technologies provides an unprecedented opportunity for the development of novel genres. Communication technologies have prompted an explosive growth of on-line content. Multimedia provides a flexible and extensible medium that allows for presentation possibilities. Designers can make use of these multimedia capabilities to create custom presentations of on-line content that support the needs of the particular community they are designing for.

In this paper we describe novel metaphors for presentation of on-line news. Our design was driven by the needs of the particular community we were working with, as well as by the constraints and opportunities of the technologies available to us. Before describing in detail the characteristics of the community and the technologies, we present in Section 2 a broader context for our design: we discuss the news genre in general, showing how, regardless of the presentation medium, reading the news is a task with unique characteristics which requires its own novel genre in order to maximally facilitate the communicative needs of news writers and readers. Section 3 describes the particular environment in which the dissemination of on-line news was targeted, and outlines the technological background of our work. Section 4 presents the dynamic document viewers.

2 News as a genre

News stories are themselves a specialized genre which meet particular communication needs: “...the news presentation metaphor must assist the users by making it easy to browse, easy to skim or to read in depth, by providing a comfortable sameness, and by making the process itself an enjoyable part of the day” [12]. Several analyses of news reading behavior underlie this observation:

- paths through a newspaper are individualistic and nearly impossible to predict [1],
- readers skim news headlines picking-up only those aspects that fit with their current interests and/or understanding [10], and
- reading the news is an habitual activity that generally takes place at the same time [11].

This agrees with our informal observations of how readers absorb news. Few people read a newspaper from front to back. Many glance at the front-page headlines, jumping
to stories that look interesting. ‘En route’, they might skim other stories that catch their attention. Only those stories that hold particular interest are read in full.

2.1 Paper-based news

Traditional paper-based newspapers have evolved mechanisms to support this style of reading. They make it easy for readers to quickly get an overview without having to delve in-depth into all the articles, and without having to turn all the pages. In the Wall Street Journal, most of the front page is taken-up by brief overviews of the day’s business, national and international news; longer versions for those readers who are interested, can then be found inside the newspaper. Investor’s Business Daily exploits a device for (editorial) filtering and prioritizing of news stories, with the results presented to the reader as a highlighted “IBD’s Top Ten” at a prominent position on the front page, with links to more information in the body of the paper. The New York Times also makes use of several summarization and presentation techniques to help readers locate stories of interest. First, it uses the traditional technique of large bold font for news headlines. Second, it has a side-bar on the front-page that advertises a few key news stories to be found in the main section. Third, it has a news summary on the second page with categories covering the three main sections of the main section of the newspaper—International, National, Regional—as well as categories corresponding to the major physical sections of the newspaper. Each of these summaries has a ‘link’ (page number) to the full story.

2.2 Computer-presented news

A particularly rapidly evolving electronic genre is that of on-line news. In fact, long before the Web of today, news stories were being delivered via on-line news feeds. These had very little by way of specialized form to enhance communication, and were purely a stream of text characters, divided into individual stories. Their ‘users’ were primarily the news agencies themselves. The Web has changed that, allowing news to be delivered directly to end users. This itself necessitated the development of more specialized presentation metaphors, focusing on issues like:

- news stories categorization, and news organization,
- personalization,
- cross-indexing of information,
- content overviews,
- screen real-estate management,
- delivery schedules and regimes.

Sites like PointCast (Figure 1) exemplify the on-line news genre. They often emulate traditional newspaper genres, incorporating headlines and news summaries to help readers skim news content and find stories to read in-depth.

Still, such sites do not exploit the full potential offered by combining state-of-the-art content analysis technologies, dynamic multimedia presentations and graphic design. For example, to the limited extent that automatic summarization techniques have been used, ‘summaries’ are generated by extracting certain sentences from the full documents; little attention is paid to problems associated with such an approach to ‘summarization’ [2]. The dynamic properties of computer displays are severely under-utilized: apart from variations of the ticker-tape metaphor—security price tickers, sports result tickers, newspaper headline tickers—the pages at news sites are largely static objects, requiring pro-active user involvement via mouse control and scroll bars to navigate the information.

In addition, news sites regard themselves as centers for ‘one-stop’ shopping. They are either of the portal variety, e.g. Excite, where the user goes to read an on-line newspaper, or of the subscription variety, e.g. PointCast, where the user subscribes to a number of news delivery channels which are ‘pushed’ right to the user’s desktop.

In general, the designers of current on-line news genre have tended to concentrate on issues like speed and ease of delivery (“get the latest, most up to date news stories right on your desktop”), personalized news presentation (“create your own personal newspaper containing only those stories you want to follow”), and creating a sense of community (“meet the people behind the news; share your opinions with other readers”).

Some of these techniques do make it easier to browse and skim news stories, while allowing readers to readily access and read in depth those stories that interest them.
Being able to customize the news stories people receive arguably reduces the need for readers to skim over stories they are not interested in; in general, however, readers are in fact faced with even greater information overload because they are now getting stories from more and more sources ‘pushed’ directly to their desktop. In our design we strive to reduce information overload to make it easier to browse and skim news by providing:

- our own news foraging/gathering process,
- peripheral awareness of constantly changing news,
- automatically generated topic-based overviews, and
- dynamic displays of current news.

3 Designing the dynamic document genre

Our design work has taken advantages of new technological opportunities available to us, while at the same time focusing on supporting the needs and work practices of the community who are our target on-line news readers. In this section, we describe the technological opportunities and the needs and work practices that have been the forces shaping the presentation metaphors we have designed.

3.1 Community needs

Genres evolve to support the communication needs of a community. The community we were designing for were a group of about thirty industrial researchers who were all members of the same lab and worked on related projects. They were co-located, with offices all on the same floor surrounding a central common area. The members of the lab had already been using an on-line, community newspaper [7] to share news about what was happening within the community.

The Lens Newspaper provided a Web-based presentation of news in a classic newspaper format. News stories were written directly by community members, without an intervening editor, and contributed by simply sending e-mail to a dedicated address. Software running on a server automatically stored, formatted and re-displayed the sender’s mail as an HTML news article—where the subject line of the e-mail became the story headline, the body became the story text, and the sender’s picture and associated project were placed next to the story. The newspaper was thus simply a web page, and could therefore be viewed from any web browser. In addition, the Lens Newspaper was projected on a wall in the common space shared by all in the course of the working day, thus exposing all lab members serendipitously, and asynchronously, to the ‘news of the hour’.

The Lens Newspaper (Figure 2) proved highly successful as a genre for sharing news about what was happening within the community. The original design focused primarily on authoring, organizing, delivering, and archiving articles originating from within. Figure 3 illustrates schematically the organization of the Community Lens.

![Figure 2: The Lens Newspaper: Front Page](image)

It soon became clear that the community also needed a way to access and quickly view news from outside sources relevant to the interests of the community. This situated the design problems we were faced with. Based on the theories of news reading (Section 1), we saw our challenge as supporting skimming of external news stories, while at the same time allowing anyone who wanted to, easy access in depth on any particular story. In addition, we needed to ensure that absorbing the news was a seamless and enjoyable part of the day that did not distract from other tasks or involve additional work on the part of the readers.

The specialized needs of the community we were working with further led to specific design issues that needed to be addressed:

- how to find news stories relevant to the community?
- how to present news not only at the desktop of a single news reader, but on a large-screen display common to a community of readers?
- how to create a rich, informative and interesting display of news content that supports skimming when the viewer has no access to navigation controls?
3.2 Technology opportunities

The questions identified above are addressed by matching novel technology opportunities to the design issues.

3.2.1 Linguistic analysis: Content abstraction

Partly in an attempt to address the problems arising from using sentenced-based summaries as document abstractions [2], and partly to address specifically the need for multiple levels of detail in such abstractions (see Section 1 above), we take a novel approach to the problem of document content characterization.

Key to supporting skimming is to be able to present the reader rapidly, compactly, and yet with a usable degree of depth and representativeness some idea of the content of a news story: informally, this is referred to as its “aboutness”. In our framework, we derive content characterizations as collections of highly salient topical phrases. These are embedded in layers of progressively richer and more informative contextualized text fragments; “contexts” here refer to meaningful fragments defined by a containment hierarchy of information-bearing phrasal units, and organized as capsule overviews which track the occurrence of topical phrases and other discourse referents (objects in the news story) as the story develops across the entire document.

The notion of capsule overviews as content abstractions for news is explicitly designed to capture “aboutness” [4]. This is represented as a set of highly salient, and by that token most representative, phrases in the document.

Viewing topicality in its stricter, linguistic, sense, we define topic stamps to be the most prominent of these phrases, introduced into, and then elaborated upon, the document body. On the basis of this definition, we have developed a computational, algorithmic, procedure for deriving...
a set of abstractions for the core meaning in the document [3] [4], ultimately resulting in a capsule overview of the document based upon suitable presentation of the most representative, and most contentful, expressions in the story.

Such abstractions comprise layered and inter-related phrasal units at different levels of granularity, organized in a containment hierarchy, as illustrated in Figure 4. The hierarchy naturally layers progressively richer information ‘snippets’ relating different document fragments: topic stamps are embedded in (or contextualized to) more informative relational phrases; these are further elaborated by the sentences in which they appear; sentence contents are viewed in the context of the enclosing paragraphs, themselves contextualized to thematically coherent document segments.

### 3.2.2 Temporal Typography: Dynamic Presentation

Recent research in multimedia content presentation, graphic design, and typographic layout taking advantage of novel (electronic) media [9] [13] [14], has opened the door to appreciating, and experimenting with, the possibility of escaping the static and rigid constraints of writing on paper.

Imagine you are looking at a small area on a computer screen. Words appear and disappear on the screen one by one. As they appear, meaning is expressed as forms change dynamically over time. The combined effect of the message, form and rhythm express a tone of voice, emotion or personality as if you hear a person speak. Although the two mediums, spoken and written words, are vastly different, the analogy may give you a sense of the expressive potential of temporal typography. (Wong, [13])

Dynamic documents allow visual manipulation of document content over time. This adds a new expressive dimension which can be used to enhance the message contained in the document, typically by conveying it in ways different from the traditional, static, sequential presentation of discourse.

Dynamic content delivery is based on ideas of temporal typography developed by [13]. This work is based upon synergy of psychological studies of reading, graphic design, and temporal presentation of text. Graphic design history is rich with examples of experimenting with visual treatment of written language. Designers have begun to explore temporal presentation of text in television and film media. Studies of reading, which to a large extent form the basis of Wong’s work, have explored dynamic presentation of content, related to the interactions between meaning and intent of a text-based message.

With the migration of news delivery over the World Wide Web and the growth of information ‘push’ vendors, we are beginning to see some methods for presentation of news stories which use notions of dynamic delivery of content. Most of these are variations on the same theme: news delivery using the ticker metaphor. Thus both ABC’s news site and PointCast employ a traditional horizontal ticker, CNN Interactive arrange their ticker vertically, while CBS combine a ticker with photos from a major story.

All of these designs share a fundamental insight: tickers are dynamic objects, which can be programmed to continuously update themselves from a news feed and to cycle in a pre-defined regime, therefore not requiring user intervention. Furthermore, they can be dispatched to an area of the workspace (monitor screen) where constant, yet unobtrusive, news delivery can take place in the periphery of the user’s main activity: thus a choice exists between pro-active engagement with the news source, and passive (and almost subliminal) monitoring of news data.

No current ticker design exploits an automatic summarization engine. Mostly this is because sentences—especially non-consecutive ones, in the absence of visual markers for discontinuity—do not lend themselves easily into a word-by-word, left-to-right, presentation mode. This is clearly a situation where phrasal units of a sub-sentence granularity can be used much more effectively [2]. In addition, psychological experiments on active reading [13] show that when text is presented dynamically in the manner of a ticker, subjects’ reading speeds are significantly slower than for text presented statically. Conversely, dynamic presentations of text which show words or short phrases in the same location but serially, one after the other, have reading speeds comparable to those for normal static texts.

No applications to date use temporal typography for dynamic delivery of content abstractions. Wong has looked at how dynamic type in general can be used for four different communicative goals: expressive messages, dialogue, active reading and real time conversation [13]; her experiments on active reading are of particular relevance to us here. One of these uses a basic rapid serial visual presentation (RSVP) method (words or phrases presented sequentially one after another, on the same line and at the same position) to deliver a sequence of news headlines. A second set of experiments (HIGHWAY NEWS) uses three dimensions, combined with a zooming motion, to present a sequence of text highlights. “News headlines are placed one after another in the z-dimension. Headlines are presented serially according to active input from the reader. The reader presses a mouse button to fly through the rows of headlines—as if flying over a highway of text.” [13]. These experiments show the strong feasibility of high impact-low engagement delivery of semantically prominent text fragments being utilized as a powerful technique for visualizing certain types of inherently linear information.

While such work does not rely on automatically generated meaning abstractions as its input, it is clear that the topically-rich capsule overviews generated by the document analysis technology we have developed (Sec-
would regularly encounter them. Projecting the large screen play news stories in such a way that all members of the lab happening in the lab. One way to ensure this was to dis-

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ation 3.2.1) are just the kind of semantic highlights which Wong’s experiments in active reading assume. Conversely, up till now there has been no thought as to how the nature of topic-based capsule overviews in particular would fit the notion of dynamic type. In our dynamic document view-

ers, these techniques are combined to dynamically present automatically generated topic-based capsule overviews.

3.2.3 Need2Know: Custom information delivery

Information is only useful when it is immediately accessible when needed. Borovoy et al. have developed a technology that enables delivery of information when and where it is relevant [5]. An illustrative application of the Need2Know technology would be to use it as this article is being written, for continuous background retrieval of relevant documents, particularly appropriate to the context of the current text being composed. In essence, an on-going comparison of what is being written, against an index of an existing database of articles, constantly ‘suggests’ documents of potential relevance that are only a mouse-click away.

The work described here makes use of Need2Know, for accessing relevant news stories from on-line news sources. Relevance is determined by the interests of the community defined as a set of news filters which mediate document database index sets. We use the current contents of the community intranet, which includes the Lens Newspaper stories, to determine what is of interest. The contents of the community intranet are thus used as a search criteria against appropriate on-line news sources, from which a reduced set of news stories are returned, representative of the external news related to the interests of the community. It is these news stories that we present in the on-line newspaper using our dynamic document genre.

3.2.4 Variable-sized displays: Incidental news delivery

We are no-longer tied to our desktop machines, where one person sits in front of one screen. Display possibilities now range from large screen projections where many people can sit around and share the same viewing experience, to small devices that we can carry around with us and access information wherever we happen to be. Making use of these display possibilities broadens the design space. For this particular project, the community we were working with had already been using a large screen projection to display their internal newspaper on the wall of their common space. They had chosen to do this because they wanted a way to make community members peripherally aware of what was happening in the lab. One way to ensure this was to display news stories in such a way that all members of the lab would regularly encounter them. Projecting the large screen display in an area where lab members walked by, and also where they met for afternoon tea was one way to meet this need.

We capitalized on this existing set up when designing our dynamic document viewers. In doing so, we sought to make reading the external news a regular part of lab members day, timed to coincide with specific periods of the day, e.g. when traffic through the display area is high. We also thought that because the common area had comfortable chairs where lab members could sit around and view the large screen display, the news displayed there would become a point of conversation, thus additionally enhancing the news reading experience. To make optimum use of this large screen display, we had to specifically design presentation mechanisms that would operate appropriately within this context. In particular, we had to design rich, informative news delivery mechanisms capturing the attention of anyone passing by, and allowing them to skim news content even when they had no way of interacting with what was on the screen.

More recently, we have been exploring the possibility of using handheld devices to read the news. The dynamic document genres we have designed are ideal candidates for the small screens found on such devices. In particular, the small units of abstraction generated by the linguistic technology we use (i.e. topic stamps, with or without their relational contexts) are much better suited to the small screen display, compared to the sentence-based summaries generated by conventional automatic summarization technologies [2].

4 Dynamic documents

The combination of the four technologies described above underlies a dynamic document genre for delivery of on-line news. Need2Know finds news items relevant to the community’s interests by using the current contents of the community intranet as a search/filter criteria against several on-line news sources. A process of linguistic analysis generates topically-rich capsule overviews for each news story, which are then presented through a set of dynamic document viewers. Alternative presentations are available depending on whether news are being viewed at the desktop, or on a large screen.

To date we have designed and prototyped viewers that fuse and explore the ideas and technologies discussed above (for a more general description of the viewers see [2]). These viewers are embedded within the Lens Newspaper. Two of them, RSVP and ViewTool, are used within an entirely separate, new, section of the newspaper devoted to presenting external news. The third, TopicsTicker, is a variation on a news ticker. It resides at the bottom of the Front Page of the newspaper and shows highlights from
news stories that can be found on other pages (Figure 3).

The designs of RSVP and the news ticker (TOPIC-TICKER) focused on minimizing user interaction. This makes them ideal for use on the large screen projection of the on-line Lens Newspaper. RSVP allows the reader to delve into news stories in progressively deeper levels of detail, starting from news highlights, and ending with detailed contextualized news snippets. TOPIC-TICKER allows the reader to rapidly skim through news highlights, while providing direct visual access to the context of the highlight within the news story itself (see below).

A different viewer (VIEW-TOOL) was designed for use by readers at the desktop. It takes full advantage of interaction, and leverages it to offer more detailed presentation of news highlights within the full context of a news story.

All of the viewers assume an environment where incoming news stories get analyzed to capsule overview level (Section 3.2.1); the results of the analysis are embedded into the original text source by means of special purpose tags. These augmented text files (document content plus highlights markup) are then used by the dynamic viewers, the augmentations being translated into specific on-screen visualizations.

4.1 Contextualizing news highlights

Our primary design criteria in developing the dynamic news viewers—quick skimming of news content while retaining the ability to engage in depth in any particular story of interest—required that we explore different ways of visually representing the topical news highlights derived by linguistic content analysis. It is important to realize that skimming requires much more than just news highlights; contextualizing those to the right fragments of the news article is essential for the readers’ ability to interpret these highlights. In designing a genre for on-line news we thus sought to present salient topic stamps together with the contexts in which they appeared in the news story.

4.1.1 RSVP: topical highlights

Designed for a situation where news would be viewed on a large screen display, RSVP aims to allow skimming in context with minimal interaction by the reader. The display cycles through the set of topically salient phrases or topic stamps that have been derived through content analysis. These phrases are displayed in the center of the screen in the order in which they appear in the news story; each phrase is contextualized to secondary, but still essential, background information (Figure 5). Cycling through the complete set of topic stamps in this manner gives the reader a good sense of the aboutness of a news story. Each news story is displayed in turn.

If readers are interested in a particular phrase, they can click on it and will be taken deeper into the story as the display changes to zoom in on the relational context of that phrase within the story. This is implemented using a visual ‘zoom’ mechanism, which helps the reader understand what is happening. In order to maintain context, the original topic on which the reader has clicked remains displayed, as translucent text in the background. If the reader is interested in delving still further into the news story, they can click again and now will see the topical sentence displayed in the foreground with the relational context and original topic stamp in the background (Figure 6 illustrates the transition, after a mouse click, from Figure 5).

At any given point of time and depth of detail, the display uses a combination of visual cues to highlight the information-bearing unit which is in focus, and associate
Maintaining the context in this way helps the reader interpret the highlights they are viewing. In the example in Figure 5, the anaphoric “he” in the foreground relational context is resolved for the reader because the antecedent “Gilbert Amelio” is available for reference in the background. Similarly, phrasal contractions can be related to their full canonical form in the text (this would relate e.g. “machines” to “desktop machines” in particular; see the topic stamp and its relational context in Figure 4). In conventional summarization technology, isolated sentences with such ‘telegraphic’ references are very hard to interpret, as links between anaphors and antecedents are lost; our dynamic displays make the link obvious (assuming, of course, that the linguistic analysis has recovered it [8]).

To maintain overall context, the title of the story being viewed is continuously displayed at the top of the page. Readers can navigate to particular stories using a pop-up menu to dynamically select a story to view within RSVP.

RSVP is particularly well-suited for deployment in a large screen projection in communal areas, as in this situation a news fragment might catch a reader’s peripheral attention, and prompt them to take a further look. RSVP is the default viewer presented on the External News page of the Lens Newspaper.

### 4.1.2 ViewTool: story gisting

Not all news readers in our community view the news on the large screen display; some of them look at news stories on their desktop machines instead. ViewTool is an optimal viewer for this situation as it takes advantage of the highly interactive nature of the desktop, and provides multiple ways for the reader to selectively skim news highlights. It also takes advantage of the desktop reader’s ability to see more details of the screen display, and therefore it chooses to maintain, continuously, the complete news story context in the form of a document ‘thumbnail’.

ViewTool employs three information panels, to display different aspects of the document content. Topic stamps, shown in the central panel, are presented adjacent not only their immediate relational contexts, but also to the full news story context in which they appear. This is provided within a document “thumbnail” displayed in the left panel. Minute details of the story are hidden in the thumbnail, but it carries visual cues to the distribution of the topic stamps in the document, the location and relative ordering of the stamps, the size of the document, whether the story contains any pictures, etc. To further facilitate contextualization, topic stamps displayed in the central panel are aligned with their discourse segment in the thumbnail (Figure 7).

![Figure 7: ViewTool: the user is scanning the topic stamps in the middle panel. When the mouse is positioned over a set of thematically related topics, their discourse segment is synchronously displayed in the left panel. The right panel displays, in an RSVP-like manner, the relational contexts for the selected topic stamps.](image)

In the right panel, a separate ‘details’ area constantly displays additional information pertinent to the information-seeking context the user is currently engaged in. The details area is used both for dynamic display of richer contexts, as in the RSVP viewer, and for providing access to the full text, or topically coherent segments from it, on demand. Color coding is used throughout to link topic stamps in the central panel to the news story context in both the right and left panels. This follows the aim of ViewTool’s design to develop a more elaborate notion of context, while maintaining permanent focus on the salient highlights (topic stamps) in the news story.

The central panel is sensitive to the user’s focus of attention: as the mouse rolls over a topic stamp, the discourse segment from which this topic has been extracted is highlighted in the left panel. The highlighting also indicates the segmentation of the source news story into topically different, distinct, and thematically coherent text sections. This design allows for directly focusing into areas of interest, as the news story is mediated by the topic stamps-per-segment display. Again, due to granularity of analysis and layered
contextual information in the capsule overview, immediate and more detailed information about any given set of topic stamps is available: simultaneously with highlighting the appropriate discourse segment in the left panel, relational contexts for the same set of topic stamps are displayed dynamically, in RSVP-like fashion, in the right panel. Topic stamps are thus always related to contextual cue phrases. An additional level of detail is therefore made available to the user, with minimal ‘prompting’ on their part; if it is still the case that the full text of the segment would be required, clicking on its ‘proxy’ topic stamps (in the middle panel) would display this in the right panel. The larger area available there, as well as an automatic readjustment of the size of type, ensures that the text is readable (Figure 8).

As a natural extension of the same metaphor, clicking on the news story thumbnail in the left panel brings up the full news story text in the right panel. The full text always uses color markup to indicate, in yet another way, topically salient phrases and their relational contexts.

4.2 Continuous awareness of news highlights

A core constraint for the design of the news viewers was that they be integrated into the existing on-line newspaper. One way of viewing this newspaper was on a large screen projection unit, located in a common area. In this situation, navigation had to be kept to a minimum as viewing tended to be mostly serendipitous, given that community members were passing through this area or were sitting chatting at tea-time. Typically, it was the front page of the newspaper that was displayed on this screen (see Figure 2). This called for a way to make the contents of the inside pages of the newspaper visible on the Front Page. There was no need for sophisticated access mechanisms to the full story on this page; all that was really required was a way to let our readers know what could be found inside, should they be interested to navigate further, in much the same way as headlines are displayed on the front page of a traditional newspaper to draw passers-by to a news stand. A variation on a news ticker was designed to meet these needs.

TOPIC TIGGER is a minimalist, hands-free, peripheral- vision-directed ticker tape, with certain aspects of its display tuned for serial delivery of the topic stamps on a news story: the string in the left panel is the title of the news story, and the right panel is where the display cycles through the topic stamps. Switching from one story to the next is cued by a color change and a vertical scroll made particularly visible in the left (title) panel.

TOPIC TIGGER is displayed at the bottom of the Front Page of the on-line community Lens Newspaper (Figure 9). It gives readers of the Front Page an idea of the contents (“aboutness”) of other pages of the newspaper. News articles, both external, and internally submitted by local community members, that appear on inside pages of the newspaper, are analysed and reduced to topical highlights most representative of the content of the articles.

Without any user intervention the display cycles over all topical highlights for each news story in turn. Clicking on a news headline in the ticker takes the reader to that news story in either the External News or the Inside sections of the Lens Newspaper; clicking on a specific topic stamp positions the reader at the discourse segment in the story where that topic stamp is first introduced and discussed.

TOPIC TIGGER differs from more traditional tickers in that it displays more than just headlines. Through the dynamic display of automatically generated topic stamps it reveals the core content of the news story. In this way the traditional ticker form is combined with novel content to make it another example of the dynamic document genre.
5 Conclusions

We make novel use of state-of-the-art linguistic analysis technologies in order to get informative, and usable, abstractions (capsule overviews) of document content. We also deploy recent research on dynamic type and temporal typography in order to effectively use those abstractions as ‘entry points’ to the full documents. We tailor our design to the specific characteristics of the news browsing and skimming task, as it applies to individual users as well as an online community, and we target the delivery of the document content not only to the desktop, but also to variable-sized displays such as wall-mounted projection devices.

This particular mix of technologies facilitates browsing, skimming and in-depth reading of news stories, continuously arriving via a mix of pull and push channels. Our designs cater to situations where news arrival may be a peripheral event to users otherwise engaged, and thus seek to maintain awareness of main news items in ways which are responsive to the news flow, and yet are non-obtrusive and seamlessly integrated in the work environment. At the same time, more in-depth reading is supported, on demand, by having the viewers successively reveal more of the document content in response to the reader’s interactive requests.

Although the dynamic document genre described in this paper was produced within a particular design context, other contexts where people read documents on-line share many of the characteristics discussed here. For example, the need to support skimming documents and making it easy for readers to access the details of document content is typical of tasks such as researchers looking for information on a particular topic, market analysts culling recent news, students trying to get a general feel of a topic they are studying, readers of consumer reports trying to decide on their next purchase, members of on-line communities trying to catch up on what has happened since they were last on-line, or knowledge workers trying to cope with the deluge of e-mail. With minimal redesign, dynamic document genres could be applied to these, and similar, tasks.

Acknowledgments

We would like to thank Yin Yin Wong who developed the first prototype designs for the document viewers, Jason Swartz who programmed them in Java and Sascha Brawer who engineered the implementation of the underlying linguistic analysis engine. This work was done while the authors were with Apple Computer’s Advanced Technology Group.

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