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Creating and Viewing the Elastic Charles -a Hypermedia Journal

Hans Peter Brondmo -Graduate Research Assistant
Glorianna Davenport -Assistant Professor
MIT Media Laboratory -Film Video Section
E15-431 20 Ames Street, Cambridge, Ma. 02139, USA

ABSTRACT

We describe a collaborative effort involving approximately 15 people creating material and tools for the "Elastic Charles", a hypermedia journal. The tools are used to create an additional structural layer upon video, sound and text material which has already been edited and is in a "final" format. This structural layer - hyperlayer -is used to link related portions of the journal's "stones" together to create the hypermedia environment. Our paradigm for linking in temporal media is presented.

INTRODUCTION

It has been almost a quarter of a century since Ted Nelson first coined the term "hypertext" and text still remains the central medium of communication in the digital world of computers and publishing. We have yet to evolve a digital publication form which encompasses movies, text and graphics that can be manipulated interactively and personally by any viewer. It is our dream that in the near future such publications might be available, via subscription, on a regular basis. To some subscribers the publication might be a collector's item; others would glance quickly through and toss it out. We believe that the interactive hypermedia experience will narrow the distinction between viewer as learner and viewer as maker - two traditionally contradictory notions.

"Elastic Charles", a hypermedia edition of the hypothetical "American River Magazine", is a child of this dream. In addition to supporting multiple types of media, "hypermedia", as we define it in this paper, provides computer support for links from any "chunk" of information in the environment to any other chunk.

The journal format is a useful paradigm or "design example"[1] because it is already a familiar form. A typical printed journal contains multiple stories which can be more or less dense; these stories usually contain specific as well as non-specific content links. Over time patterns of layout and "interface" design have evolved which encourage readers to scan, browse or read the printed journal in multiple ways -- flipping through sequentially, flipping through randomly, making selections based on the table of contents, and changing the style of accessing information while reading. In our particular implementation we transposed this familiar journal, by using video, a temporal medium, as the primary information stream.

Collaboratively authored by 15 students, the "Elastic Charles" journal contains stories focusing on, the history, ecology, recreation (including the largest rowing regatta in the world), bridge reconstruction. traffic; dams and several short visual "commercials" about wildlife and pollution on the Charles River. Most stories began with a strong video component, which was later augmented by text and graphics and embellished by digital sound. Initially each visual story (including sections of stills and time lapse) was edited separately; later all the video stories were re-edited to create a more cohesive temporal flow.

Careful evaluation of how to design and create material for hypermedia publications is necessary in order to realize the full potential of the form. We feel it is important to avoid separately producing the multiple media as they would be produced when they are presented alone in their traditional forms. The media must be merged when authoring and producing the system, not as an afterthought. Issues of navigation and representation of links, or non linear paths, are important in this context and will be discussed.

In a hypermedia environment that contains temporal media, the traditional hypertext notion of a link requires extension. Links must automatically change as the content of the temporal material (for instance video) originating the link changes with time. This paper presents our implementation of a system where we can create and represent links in temporal media. Furthermore a link might only be relevant to a subset of the media types active at any given time. For example, if there are two active media -sound and video - the system has been designed to support links that are related to only one of them.

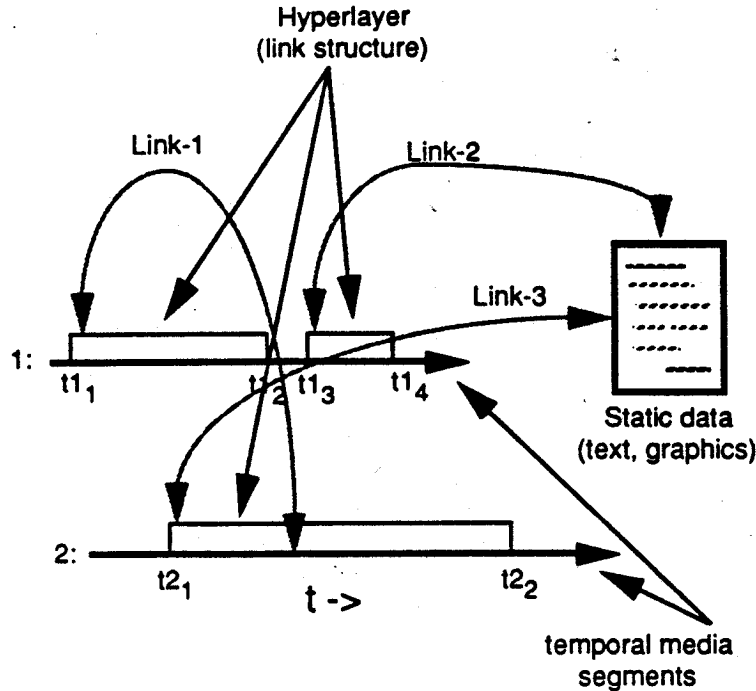
SYSTEM CONFIGURATION

The "Elastic Charles" has been developed on a Macintosh II computer with a ColorSpace video overlay (genlock) board, an NEC MultiSync II monitor and a Pioneer LD-V4200 laser disk player. The laser disk contains the video and portions of the sound. The software uses HyperCard as a platform, it's functionality extended through a set of hypermedia authoring tools. Large portions of the footage for the "Elastic Charles" were shot using the Video-8 format.

LINKS IN DYNAMIC MEDIA

The hypertext notion of a link has so far primarily been applied to text. In "Hypertext Publishing and the Evolution of Knowledge" Eric Drexler uses Jeff Conklin's definition of a hypertext link as "a facility for machine support of arbitrary cross-linking between items". [2], [3]. An item in this context is considered to be any chunk of text. We adopt the same definitions but extend items to mean any chunk of "media". Links are used to associate content related chunks with each other and ultimately to navigate between them. Some indication that a link has been associated with a chunk of information must present itself to the user. The user has the option of following the link or ignoring it. Text is static and a hypertext environment is therefore completely user driven. Links in text are visible and available until the user takes some action to change the state of the system. The property of a text link is therefore different than a link in temporal media. The content of temporal media such as video and sound changes with time. The chunks we want to link to and from therefore also change. To address this we have implemented a series of mechanisms that deal with linking to and from temporal data.

In the figure below the thick horizontal lines represent two segments "1" and "2" of temporal media (i.e. video/sound). The rectangular blocks on top of the segment indicate the hyperlayer that is used to define the time during which one or more links exist. For example in segment "1" at time t1.1 link-1 to segment "2" appears. At time t.2 link-1 is no longer relevant and disappears. At time t.3 a new link indicator for link-2 appears. Link-2 is a link to static data. The link indicator is present until time t.4. If at some time during t1.1 - t1.2 a user selects link-1, segment "1" will stop and segment "2" starts playing. At t2.1 an indicator for link-3 appears and at t2.2 it disappears for this segment.



Linking in text is based on (perceived) relationships between blocks of text. It is the interpreted content of the chunks of text that we link to and from. Linking in other data types than text introduces a new element to the concept of links. A link between two chunks of video might for example be based solely on a visual association between the chunks or they may be based on some more abstract notion of associated content.

We use a mechanism of specifying in and out points to define where a link starts and where it ends in a temporal media segment. This mechanism lets us define links between two temporal segments and from a temporal to a static segment. The system also supports links in static media and from static to temporal media.

"Link indicator" is the term we have chosen to describe the construct that we use to indicate the existence of links. A link indicator should reinforce the characteristics of the chunk it is linking to. For instance if a link is to video we want the indicator to make this intuitively apparent. Micons (moving-icons) were created as a way of indicating a link to video. A micon is a short (digital) sample of the video it is used to represent. It plays continuously (in a loop) and is most effectively used to indicate a link to full motion video that has a distinct visual signature. When linking from video to video a micon appears on the video screen as the link it represents becomes relevant and disappears once the link is no longer relevant.

Particularly in the case of temporal media the user may not want to interact during the time when a link indicator is present. Therefore at the end of the segment the user might want to "go back" and inspect links or look at the segment where a link appeared. To facilitate this kind of post-interaction the system will incrementally add link indicators to a visual list as they are presented during the temporal segment [4]. The list is presented on a card and can be inspected by the user at any time. Link indicators will thereby be accessible from the time they first appear in a segment whether they are immediately relevant to the content being presented in the segment or not.

While designed to support bi-directional links our system is currently only implemented to handle uni-directional linking. We do not find that adding two way links in temporal media raises issues different from those relating to static media.

THE HYPERMEDIA TOOLS

To create the "Elastic Charles" we have designed a set of tools that allows us to segment temporal media so we can access the segments for the purpose of using them in the journal.[5] The design of the tools was driven by two sets of demands. First the persons creating the journal would use the tools in the process of making "articles". Second a user/subscriber would use the tools when reading and viewing the journal. It became clear to us that the tools that end users of the system might want, in many instances would be the same tools that the editor/maker would be asking for. The distinction between the viewer and the editor/author/producer were fading.

Tools that have currently been built are the video segmentation tool, the video segment browser and the link tool. The tools appear in floating windows (windoids) on the computer screen. The video segmentation tool is used to create named segments of video. It provides a basic video controller and three buttons that are used to define in and out points, end and name a video segment. Once it has been created the segment appears in the video segment browser. Also when we create a segment a new entry in the "Segment data" HyperCard stack is automatically added and is associated by name with the segment it was created for. An entry can be customized to contain information pertaining it's associated segment. The information available for a segment in the "Elastic Charles" is a textual description of the segment and a list of topics represented as key words. The "Segment data" stack is used as a simple database of information about the segments that exist in the system. Key words are used to locate related segments. We have found this to be an excellent illustration of how useful it can be to have an underlying representation for non textual media such as video. By segmenting the video and by associating key words with each segment we are able to explore relationships between the segments which might otherwise not have been obvious. These relationships can be used as the foundation for creating links.

The segment browser has been designed to facilitate identifying and inspecting video segments. Once a segment has been created using the video tool, it appears with it's name and with a generic icon in the browser. A still frame of video can be grabbed, iconified and associated with the segment. For video segments that have a strong visual component the iconification of a key frame represents an important visual identifier. In addition to visually inspecting the lists of icons and their names, playing segments and going to the information stack entry for a given segment, it is also possible to play a segment's micon from the browser. As mentioned micons are short "digital-movie" samples useful for identification of the (visual) content of video.

The link tool lets you create a link in a video segment to another segment or to a HyperCard card. As mentioned earlier the icons and micons are used as link indicators. Links in video are created by dragging the chosen link indicator on top of the video and defining an in and out point for it within the segment we are linking from. On consecutive playings of the segment the link indicator will appear spatially where it was placed and temporally when the "link in" was defined. The indicator will disappear at the "link out" point While a link indicator is visible a user can click on it with the mouse causing the video segment the indicator represents to start playing or causing HyperCard to go to the card it represents.

NAVIGATING

Where have you been and how did you get there? How do you get back? When reading hypertext documents these are difficult questions. Providing the proper facilities to aid the user as well as the author of a hypertext system with a means of tagging relevant pieces of information and giving them a feeling of progress as they move through information in non-linear ways has represented a real challenge. As images, full motion video, sound and animation are included in the definition of "information space", navigation becomes even more complex. In " Active Paths Through Multimedia Documents" scripted documents are suggested as one way of controlling and aiding the hyper- or non linear experience [6].

The design of our navigation mechanism has made use of the way information is organized in a hypermedia publication. By using visual, audio and text cues from "stories" made up of multiple types of media, we have attempted to build an environment where it is possible to identify a piece of information through it's most distinct feature, be it visual, audio or text based.

HyperCard serves as a scripting environment for our hypermedia system. This has given us great flexibility as authors to experiment with active paths through the "journal" or guided tours through "hyperspace" [7]. The initial guidance that such active paths provide are intended to support users unfamiliar with the system with a structured mechanism for accessing the journal. By example we have built a narrated "introduction" which will take a first time user through the entire journal briefly introducing topics, features and functionality.

As mentioned above the issue of navigation is further complicated by the fact that links in dynamic data must themselves be dynamic. To address this issue we provide several ways of reviewing the history of an interactive session as a means of aiding navigation and offering graphical representations of the information space.

The recent segments card in "Elastic Charles" is always available at the click of a mouse. The card displays a list of icons representing a key frame from the twenty five last pieces of video that have been viewed. By pointing to the icon and clicking the mouse it is possible to view the actual video segment associated with the icon, to go to the story where you saw the video or to play the micon associated with the icon. The very visual nature of this interface is intended to promote a mode of interaction with associative searching and retrieval based on identifying the iconified key frame with the story where it was seen.

The same pitfalls exist for the hypermedia journal experience as exists in other "hyper structures". It is clearly possible to view articles and then forget how to get there when wanting to return. In a hypermedia environment this is further complicated since it is possible to get to articles without going through the table of contents (by following links). The structural overview card shows the top level structure of the journal. Stories are represented by iconified images of their first card (front page) and by their name. Arrows indicate how it is possible to access articles through the table of contents. If an article has been visited during a session, that article's icon is outlined with a heavy black box on the structural overview card. This offers a fairly structured yet not too detailed way of outlining what portions of the journal have been visited and which have not. The intent is not to provide a graph representation of all paths through the system, nor is the representation intended to be dynamic in the sense that paths change, but rather the card offers a high level indicator of the main stories that have been visited.

CONCLUSION - HYPERMEDIA GREATER THAN ITS PARTS

Hypermedia is a new form that should condone "playful" exploration as a central means of interaction. But we would like to stress that hypermedia is more than multiple media and a link structure. Hypermedia as form has the potential of becoming greater than the sum of its parts. Our goal in evolving new design examples is to further, develop the potential of this form and to better understand how the concept of links can be realized for temporal media. It is our hope in releasing "Elastic Charles" that a broader audience of viewers and makers will share their impressions with us and that their feedback will further help define the form.

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