THE TEMPORAL DIMENSION OF HYPERTEXTUALITY

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Abstract
Awareness of the conceptual underpinnings of hypertext is important for effective design. Authors work most obviously with the spatial dimensions of page presentation but also with the manipulation of temporal dimensions of events both of which are fundamental to hypertext but rarely considered by non-professional hypertext users. This paper examines the temporal conceptual considerations of hypertext and suggests several facets of temporal representation pertinent to narrative presented as hypertext, for web or other use. These are illustrated by three examples, two moving visual narratives (one a real event and the other a created event) and a written narrative. These may be used as a guideline in the authoring of hypertext documents or as a means of identifying aspects for discussion.

Introduction
The origin of this paper came out of the experience of running introductory hypertext design workshops for first year teaching students. Students were required to select an extract from a children’s story and submit proposed alternate endings on a Web site or on a disc. In the workshops it was clear that with the use of software templates, or wizards, they were quite competent in creating hypertext documents. However, it was also obvious that few students could demonstrate a capacity to think beyond the linear (end to end) formulation of a text with pages being linked for use either in a chain pattern or in a cartwheel form from a main page. In exploring how to motivate novice users to think beyond the box, discussion centered not only on the spatial arrangement of page presentation but also on philosophic questions of the nature of time. There is a paucity of literature in this area with few mentions of temporal dimensions as a consideration in the authoring of such documents.

Visualising Hypertext
Hypertext is fundamental to CD-Rom software, internet pages and Web sites and is defined by the Oxford English Dictionary Additions Series (1993) as “text which does not form a single sequence and which may be read in various orders; especially text and graphics ... which are interconnected in such a way that a reader of the material (as displayed at a computer terminal, etc.) can discontinue reading one document at certain points in order to consult other related matter” (cited by Blustein, 2002, 1.2 What are hypertext and hypermedia? ). Snyder (2000) extends this definition by describing hypertext as “fully electronic non-sequential reading and writing” (p.103).

To provide a visual metaphor for the student teachers it was explained that one way to visualize this process is to consider a group of people in which each individual represents a chunk of information. If we were to place this information into a conventional paper-based book form we would see the group of people lined up in a specific order, perhaps according to height or age. In hypertext this same group of
people can be imagined playing the party game of *Twister* in which the author selects which people will take part and the colour and shapes where each is required to place their hands and feet on the mat. Attempting to achieve this by twisting around allows contact with others in different ways (hip to shoulder, head to leg, and so on) and is analogous to deciding what information will be included in the hypertext text and how it will be linked. Just as there is potential for a number of physical connections that would lead from one person to another in the game so hypertext offers a number of links between chunks of information.

In the case of a narrative, it changes from a linear process when using a paper-based book, to a non-linear, multi-pathed, multi-dimensional (holographic) experience when using hypertext where readers “choose individualized paths” (Landow, 1992, p.7)

In the initial years of hypertext research focus was upon examining the relationship of hypertext to the printed page and book format, however Miles (2001, ¶ 1) stated that “A great deal of recent hypertext theory … is now interested in space and time”. This appears to have been an overstated as there has been little or no addition to the production guidelines and advice offered to hypertext authors acknowledging these considerations.

**Using Hypertext**

Design and production of hypertext documents is no longer restricted to those with technical knowledge or software engineering skills, nor to the multi-media expert of the early days of the technology. We now approve of Web sites as an accepted format for student assignments. It is now a common communication tool used by all although there are few professionally authored Web sites by those trained and experienced in computer technology.

The United Kingdom has set up a nationwide system of approved providers of ICT (Information and Communications Technology) training for teachers and librarians to encourage such technology to be integrated in the schools (Guest, 2000). In the USA many education institutions have formally, and publicly, committed themselves to an explicit integration of technology throughout their curriculum stating that "Teachers must be comfortable with technology as a tool to engage students and enhance their learning. If new teachers are ill prepared to use the instructional tools technology has made available their professional education will be incomplete" (SCDE Commitment Letter to President Clinton, May 17th 2000, ¶3).

In Queensland, the New Basics Project calls for the use of such technology for students in Years 1 to 9:

> Mastering the interaction between new and old technologies is fundamental to the New Basics. It is also increasingly a common part of the work of symbolic analysts in new corporate and institutional workplaces. It is important that students learn to integrate and blend different media and different codes in ways that are effective in solving real-world problems in schools, communities and workplaces.  
>  
> (Education Queensland, 2000, p.39)
As the relevant literature of the last decade or so has revealed, there is a simple and common understanding of the nature of hypertext and how it should be an integral part of all students' competencies. Easy to follow wizards in many software packages allow any person with basic keyboard skills to use a self-guided fill in the blanks template to create simple but effective hypertext documents; even common Web browser applications such as Netscape provide such opportunities. However, as mentioned in the introduction First Year Education students using such packages to create simple hypertext documents show that although using the software is not difficult thinking hypertextually is.

**Temporal Dimensions of  Hypertext**

Linear thinking processes, not unnaturally, have been prevalent until the advent of electronic communication technology; the children of the new millennium though are brought up against a hypertextual background. They are not only proficient in using CD-Rom, Playstation and X-Box technology but as they become immersed in it are comfortable with the multi-dimensional, multi-imaged and virtual timing of the material. Even if not able to articulate hypertextual concepts they are competent if not skilled at hypertext browsing or navigating. Just as hypertext requires this more active 3D version of *reading*, so does hypertext *authoring*.

In her guide to writing hypertext Amaral (1995) suggests that “while readers do develop their own methods of moving about a series of documents, the author does create the master plan of a piece. Where the author provides links or doesn't, what content is left in or left out, and the placement or prominence of content … all contribute to the organization and impact of a piece. (1 .Organization section.).

The reader of a paper book uses its conventional serial structure as a guide to using the book and to finding information. Such structural devices as contents list, page numbers, headings and sub-headings are taught to beginning readers and become familiar and essential to an experienced reader. As with paper texts, the hypertext user works in three dimensions - length, width and breadth - presenting the information on the page viewed on the screen determining; how much type there should be across the screen for easy viewing (width); how many lines down the screen so that scrolling is not required (length); and what should be effective foreground and background design and zooming movement (depth). The hypertextual nature of these documents with the linking between pages and use of multi-paths is really an advanced form of depth control. These elements can be effectively achieved by following readily available design guidelines and templates. However, fundamental to hypertext is the engagement of the fourth dimension – that of time - which is least often considered by the non-professional hypertext user.

In reviewing literature on this topic it would seem that time, in the main, refers to: hardware and download/response time causing wasted user time; currency of posted material; immediate reactions to events and freshness of data; “user control of time-sensitive content changes” where the author is advised that they should “ensure that moving, blinking, scrolling, or auto-updating objects or pages may be paused or stopped.” (Chisholm, Vanderheiden, & Jacobs, 1999, guideline 7); content such as animation which “Illustrat[es] change over time. Since an animation is a time-varying
display, it provides a one-to-one mapping to phenomena that change over time.” (Nielsen, 1995, Animation point 3); and reader’s reading time.

Less pragmatic discussions of Web pages ruminate over time in richly metaphorical ways with a predominance of landscape and gardening images (In the garden of forking paths: contingency, interactivity and play in hypertext, Barnet, 1998, and, Hypertext Gardens: Delightful Vistas, Bernstein, 1998a). Fairly complex investigations of time are also discussed in the contexts of “the time-based human perception process” where “maneuvers [are] to be made within a certain time frame in some literary and all game environments” (Strickland, 2000) and in patterns of hypertextual content structure (Bernstein, 1998b) which “develop[s] a vocabulary of concepts and structures that will let us understand the way today’s hypertexts and Web sites work” and, of necessity, includes space and time considerations.

Proposition of Three Facets of Hypertext Time
“...I see the past, present and future existing all at once before me” wrote Blake (1804), and so it is with hypertext in which there are three distinct temporal states. That is the event itself, the presentation of this event as a media text (may be a book, video recording, CD-Rom, Web site and so on), and the use of this media text by a receiver (reader, viewer, audience). A narrative, presented through a medium, undergoes a process of editing according to creative notions, technical practicalities and financial limitations and when accessed through a computer it is modified by the viewers own preferences and mode of use.

Before considering three examples the temporalities of the event, text and receiver are described. Note that the terms time and duration are used in their commonplace meanings.

1. Event temporalities: (i) Contextual event time: this denotes the time frame (setting) of the events which are taking place. e.g. the occurrence of an accident to a space ship takes place in a futuristic time context; (ii) Event duration: the length of clock time of a real event taking place. e.g. the experience of standing by the road watching an accident that occurs in ten seconds, takes ten seconds.

2. Text temporalities: (i) Either a Presented event duration: when a real event is presented accurately and in full without alteration as a recording, it is presented in real time, e.g. of the same length of time as the event originally took and it may be said to be presenting the event; or a Re-presented event duration: when a real event is altered, or not presented in full, and therefore is not a presented event, or when an event is itself created and does not have a basis in actuality. All written texts, being in themselves created, can only be presented events. For recordings if the event is not presented in its entirety in real time then the length of time actually taken in re-presenting it is the re-presented event time e.g. a TV shot length of thirty seconds of slow motion to show a ten second accident; (ii) Text time: the supposed length of time (conscious) of a character’s experience e.g. time appears to stand still for a character.

3. Receiver temporalities: (i) Text reception duration: The time it takes for the reader/user to ‘read/view’ the event as given in the text. e.g for a text that is broadcast (radio, TV) this is the same time as re-presented event time. For a book, video or Web site where the receiver (reader/viewer) may start the text, leave and
return at their own convenience, the length of time that it takes to read or view the text is indeterminate. Texts that allow multi-choices for the reader/viewer to manipulate the event time by repetition, slow motion, double speed and so on, cause the receiver to become a user who can dictate how long an event will take.

These temporalities are most easily and more fully explained with reference to moving visuals

**Example 1 – Moving Visual Narrative: Real Event**

In this example a two video camera recording is used (one records the entire process in one long shot, the other in a close up shot) of a 'real' two car crash. It is to be used on a Web page with the viewer having no control of the recording (to pause or stop) as it starts automatically when the page is activated and runs until finished. Thus we have:

1. Event temporalities. (i) Contextual event time: obviously an occurrence in the immediate past; (ii) Event duration: The multiple car crash took three minutes (from skid to collision to cessation)

2. Text temporalities. (i) Presented event duration or re-presented event duration: the action is not presented in real time being shortened by editing from the original three minutes to one minute. It is a re-presented event and contains just four shots in sequence: a red car aiming for the middle of the blue car, a close-up of the face of red car's driver, the impact of the two cars, and a view of the wreckage of the red car; (ii) Text event time: not a relevant facet as the action is 'real', not created.

3. Receiver temporalities. Text reception duration: as this is not able to be altered by the receiver it follows that the duration is the one minute that is shown.

It can be seen that the Web page viewer is shown a re-presented event that differs from the real event in duration, thus, any reactions to the real event will be tempered by decisions made by the editor of the text event. However unbiased the editing may seem to be, the choice of shortening the entire sequence and selecting particular shots in a specific order may affect the emotional impact of the action on the viewer. It is certain there will be a difference between the observer of the real event and the Web page viewer of the re-presented event for being a witness at a traumatic event usually involves feelings of shock, horror, distaste, hate, and the like. A re-presented event mediated through the printed page or a monitor screen removes the reader/viewer from direct involvement, although it may be manipulated to increase emotional impact for instance by using close-up, slow motion, unusual angle, or some such device.

**Example 2 – Moving Visual Narrative: Created Event**

In this case it is useful to note how the filmic arts refer to the most observable aspects of narrative time. Bordwell and Thompson (2001) refer to the temporal duration of a fictional narrative in terms of *story duration, plot duration, and screen duration*. The correlation between these terms and the ones proposed in this paper are shown below.
In this example an acted scenario is shown through a sequence of actions, say of a two person breakfast scene. It is to be used on a Web page with the viewer having control of the text being able to pause, fast forward, rewind, re-play and so on. Thus we have:

1. Event temporalities. (i) Contextual event time: an undefined present day setting; 
   (ii) Event duration: assume ten minutes, the length of time that a breakfast of the type shown would normally take. [story duration]

2. Text temporalities. (i) Presented event duration or re-presented event duration: as this is a created event the re-presented event duration is controlled by the editor, e.g. lasting for perhaps ten seconds. This is a sequence of five video shots: a mid-shot of a boy sitting down for breakfast, a close-up of the boy picking up a spoon, a close-up of the spoon being brought to his mouth, an extreme close-up of his mouth chewing (slow motion), and a two-person mid-shot of the boy chatting to his Mum. Only the first 3 minutes of the breakfast is shown [plot duration], which is enough to indicate a morning meal taking place, and this is shown in ten seconds [screen duration]; (ii) Text event time: the moment of savouring the first mouthful of breakfast is one of exquisite sensation for the boy in this scenario. The fourth shot is in slow motion to indicate that time, for the boy at this point, appeared to be extended.

3. Receiver temporalities. Text reception duration: the time it takes for the user to view this text event can theoretically be ten seconds or unlimited depending on whether the user chooses to leave and return at some future time to complete viewing. As the user has control of the viewing the event may be manipulated so that shots can be repeated in original serial order or in variations thereof at varied speeds e.g. it may now comprise sixteen selected shots: a mid-shot of a boy sitting down for breakfast, a two-person mid-shot of the boy chatting to his Mum, a close-up of the boy picking up a spoon, a close-up of the spoon being brought to his mouth, an extreme close-up of his mouth chewing, a close-up of the spoon being brought to his mouth, an extreme close-up of his mouth chewing, a two-person mid-shot of the boy chatting to his Mum, a close-up of the spoon being brought to his mouth, an extreme close-up of his mouth chewing.

The bold type identifies shots that the viewer has chosen to repeat. Even with these changes this is still a believable narrative extending the re-presented event (or creating a new re-presented event) to two minutes and is actually closer to an actual breakfast session. This is only one of numerable user combinations.

**Example 3 – Written Narrative**

Although the temporalities mentioned above more easily engage with moving visuals they can be used in discussing written narratives on the Web (with the adaptation of 2 (ii) re-presented event duration). As an illustration the following simple text is used:

- **Child** meets **puppy**. **Love is instantaneous.**
- **Puppy** meets another **child**. **Discord grows quickly.**
- **First child** meets **second child**. **Dominance is rapid.**
- **First child** reclaims **puppy**. **Harmony is Forever.** (S.Penn-Edwards©2004)

As this is a written Web page the underlined words can be links to photos, character profiles, statistics, poetry, philosophy, literature and so on.
Thus we have:

1. Event temporalities. (i) Contextual event time: this is defined by historical/cultural milieu and varies according to the material shown in the links, e.g. stone age, Edwardian, futuristic; (ii) Event duration: this may be over a relatively short period of minutes or may take weeks however by the use of the word ‘puppy’ at the start and end of the event it is limited by the length of puppyhood.

2. Text temporalities. (i) Presented event duration or Re-presented event duration: this text is created, it is a re-presented; (ii) Text event time: within the text the time accorded to instantaneous and forever exists only in the characters’ worlds.

3. Receiver temporalities. Text reception duration: the time it takes for the reader to view this text (event) reading time can theoretically range from seconds to unlimited depending on whether the user chooses to leave and return at some future time to complete viewing. As the user has control of the sequencing of their viewing, depending on their selection of hypertext links, the described event may be manipulated. Each such reading is different.

In the instance of the latter temporality Luesebrink (2000, ¶1) suggests that an author of such a narrative needs to be aware of the temporal structure of their text in order to control reader timing of the narrative saying that:

It is useful to actually see the plot points and pause points…. Generally, a plot point is a segment of rising, significant action -often ending in a sub-climax or the climax of a dramatic sequence. This is where authors tend to avoid, at all costs, slowing the reader down or intruding into the action. Pause points, on the other hand, come when the author needs to emphasize interior character development, to encourage the reader to pay attention to symbolic or metaphoric relationships, or to give the reader a chance to experience emotion.

**Conclusion**

As shown, Web page viewers have become the authors of the text re-writing it as they choose various pathways to using the material. Re-presented text may be received as it is given or may be user edited to project many different stories. As with the real event example (1), any reactions to the text event are governed by decisions made by the editor. However unbiased the editing may seem to be the choice of shot sizes and degree of attention to the subject impacts on the viewer. In the re-presented event (example 2) there is no doubt that the placement of the chewing shot in the sequence and the shot size generates visual intensity and an almost participatory effect of eating in the sequence.

It can be seen from the foregoing that the design of hypertext documents is a significant creative act which demands consideration not only of the spatial dimensions of visual presentation but, perhaps more importantly, those of the temporal dimension.

The above examples may be used as stimulus for discussions with novice users with the aim of creating an awareness of non-linear temporal aspects of a hypertext document. Analysis of a number of hypertext documents could then be undertaken before students use the *Three Facets of Hypertext Time*, as outlined in this paper, as a foundation in
planning their own productions and in defense of their knowledge of the medium. The content of this paper, as an online teaching aid, is to be placed on the Griffith University Learning@Griffith on a new site Hypertext for Presentations and transformations for student use in 2005. At a later stage a post-use student survey will provide data on the effective use of such guidelines.

References