Intensional Hypertext*

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Abstract

We discuss the strengths and weaknesses of Ted Nelson’s Transpointing Windows. Although consistent with the medieval scholastic tradition, his vision of simultaneously viewing parallel documents only allows one to relate extensions, rather than intensions. The critique concludes that the IHTML/ConTexts approach is much more interactive and allows for real-time heterogeneity. These conceptual differences lead naturally to the notion of Intensional Hypertext, which combines the strengths of the ConTexts and of Intensional Objects.

1 Introduction

In his Web page about parallel documents, Ted Nelson of Computer Lib and Xanadu fame — the creator of the term hypertext — presents a picture of what he calls Transpointing Windows. In this scene, two texts appear, each in a window, side by side on a computer screen, and a user has created links relating individual points in one text to individual points in the other text. Ted Nelson claims that this example illustrates his understanding that the fundamental problem of hypertext is being able to see connections side by side and that this is the most fundamental tool of human thought.

At first glance, Ted Nelson’s argument seems potent. After all, it is only by placing two (or more) related entities together, and examining their commonalities and differences, that we can really infer new knowledge, which can be expressed in the form of commentaries, links or annotations.

In addition, history has shown that this general approach has allowed major works to be produced. For example, in Charles Butterworth’s The Literary Lineage of the King James Bible 1340–1611 (University of Pennsylvania Press, 1941), a summary of the contributions of previous English-language translations leading to the King James version is given:

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(1380–1400) Wycliffite versions, including English Sermons
(1525–1535) Tyndale’s work, including the Matthew Bible
(1535–1541) Coverdale’s work, including Great Bibles
(1568–1572) Bishops’ Bible and its revision
All other versions before 1611

(1611) King James Bible

Total

Another example comes from the area of geomatics. Several images are produced of a given area — from multiple passes or wavelengths — and the results are fused together through a combination of automatic and manual means, to form a single map of the region. A situation similar to the King James Bible example occurs when an existing geographical information system is to be updated with more recent in situ or remotely-sensed data.

Nelson’s view of parallel universes is also consistent with, say, the historical review of the versions of Shakespeare’s plays undertaken by Stanley Wells in the Complete Works of Shakespeare (Oxford University Press, 1987).

These examples show that Nelson’s view of parallel universes is consistent with the medieval scholastic tradition, whose primary aim was to search for the deep truth, typically defined in a religious — read idealist — manner.

But the power of networked computing and of hypertext means that we now have a medium where many people can collectively build new understanding, hence new knowledge, without there ever being a statement that, Yeah verily, we have reached absolute truth. For any non-trivial subject, there will always be more ways to delve into that subject, and a hypertext document will continue to grow, even if the original authors are long dead: the document is living.

This article will show how multidimensional multi-version hyperdocuments can be produced. It is a generalization of the IHTML/ConText approach, developed by Wadge, schraefel et al., in addition to taking advantage of the recent development of Plaice’s Intensional Objects.

The rest of the paper is organized as follows. We begin with a critique of Ted Nelson, showing the fundamental flaws in his approach, and comparing it to the intensional view of the ConTexts. We then give a technical presentation of Intensional Hypertext.

2 A critique of Ted Nelson

In the following discussion, we consider places where Nelson’s vision of hypermedia, while hyper, is not interactive, at least not with the system representing his so called “parallel documents”. The work over the past several years on Intensional HTML in general and on the ConText paradigm in particular demonstrates that the intensional programming
community is well ahead of the curve in modelling non-linear, intensional, truly interactive
digital documents.

He doesn’t think intensionally nor interactively. His parallel versions are the viewing of
pre-existing extensional documents that are to be the passive recipients of the Objectifying
Gaze of the Subject. The hyper media power of Ted Nelson’s user is to make their own
links between representations of preexisting documents. The documents themselves are
static.

In our community’s work on versioning of documents, the user is not simply The Doc-
ument Master where the computer simply makes multiple views of data available. The user
is frequently an investigator, seeking not just information, but knowledge. And we have
found that sometimes the best way to gain knowledge is to build it associatively, through
interactions, like good conversations.

This is what sets intensional ConTexts, for instance, apart from Nelson’s parallel ver-
sions. Nelson envisions data as the passive recipient of the Document Master’s gaze in the
Making of Meaning. ConTexts imagine that knowledge can derive from a conversational
exchange between the ConText itself and the user. Indeed, Conversational Texts, unlike
Nelson’s extensional world, also, perhaps especially, make room for the contextual nature
of data: that it is as much where and how data is situated that contributes to meaning, as
much as what that data is. Learning, conversation, the making of meaning is intensional.
Let the system of delivery of the data reflect that.

But for Nelson, all is extensional. For instance

Parallel versions. My working definition of a document is this: a document is
an arbitrary collection of versions having the same name (and possibly under
control of the same owner), whose cross-connections and commonalities may
be important. These are parallel.                              Ted NELSON.

A document is not an arbitrary collection of versions having the same name.

There is nothing new here except the notion of arbitrariness, and that is not helpful. The
above definition would mean that all books called ISLIP Papers 99 are one document. We
call these conference proceedings; the individual papers’ “cross-connections and common-
alities” have been constructed through the subject of the conference itself, or by “having
the same name”. In this case, the collection is not arbitrary but constructed, and it is a
container for documents, but not a document itself.

So the term arbitrary seems specious.

Part of Nelson’s problem is that he seems to imagine only legacy documents as opposed
to a new type of document structure informed by the possibilities of versioned hypermedia.
In other words, the above Parallel Universe definition and notions of Parallel Documents
suggest that preexisting documents be collected and set up to be viewed in parallel where
their connections may be viewed simultaneously, side by side.

As was mentioned in the introduction, this midrash approach to text has been practiced
by Renaissance Literary scholars for some time, as they are confronted with many versions
of a document (a Shakespeare play, for instance) and must reconcile the differences among
these copies when bringing a “standard version” to print.
Before computers, copies were printed on transparencies and held against each other for fast detection of copy differences.

This is one aspect of viewing true legacy documents and exploring differences among them. The only thing particularly hyper about this is the ability to compare any one version against any other. The operation, like that envisioned by Nelson in his 1972 Transpointing Windows, is but one way of viewing multiple instances of several pre-existing documents.

Nelson’s site, for instance, gives the example of such a document as

“The Carol Burnett Show” archive

It was recently announced that 284 episodes of “The Carol Burnett Show”, and all the associated documents (some 350,000 pages) will be donated to the UCLA library. We may think of this as being 384 parallel documents (a set for each show—notes, scripts, and the recorded show itself); or we may think of the whole collection as a single, fairly large-scale parallel document.

Ted Nelson.

Such a “parallel document” would be not much other than what a database today could render. Fields are Sets, Shows, Scripts, Video. Search criteria return the relevant info to be viewed simultaneously.

Again, this could very well be valuable, and there is a literature that considers a database as document, and databases do render versions of documents, but is this the best we can do? More of the same?

In the above example, Nelson’s idea simply makes available multiple views of pre-existing documents. The 1967 episode 22 against the 1972 episode 22. This is not versioning, just parallel views of similar data types.

And while simultaneous viewing of similar documents may be indeed truly rewarding, simply viewing two documents in a polar way does not really harness the processing power of the computer. Such viewing, however, is modeled on the notion of the data being static and the user being the only active component of the system.

This type of hyper media, where the user contributes the connections between the views, may be hyper in some sense, but it is not interactive. That is, the document is only a body on which users inscribe their meaning; the document does not contribute to the process of creating the associations for the user. There is no interaction, only reception of the user’s claims.

Ted Nelson dreams his own dream of hyperactive media, of manipulating and cross connecting parallel documents. It’s a solopsistic fantasy of the master builder. The Xanadu project itself very liberally would allow anyone the license to be such a creator.

In the ConText paradigm, we are interested in documents as interactive entities, rather than as passive collections to be acted upon, or gazed upon. We are interested in facilitating real interaction between the user, or users and the system(s).
3 ConTexts are different

Now, at this point, one might say, this is not about politics or ideology; it is about engineering intensional systems. However, nothing is innocent. All structures are informed by the particular biases of those who support or develop a given technology. See, for example, Ursala Franklin’s The Real World of Technology.

We have suggested above that Nelson’s efforts are informed by patriarchal privilege, and codify patriarchal ways of interacting with the world. By identifying and critiquing these biases, we allow ourselves ways to define better systems. ConTexts is a much better system, and that for several reasons. First, because it is based not on one man’s vision, but on research into actual strategies of interaction with information; Second, it is intensional, and Third, — perhaps best of all — it works. We’ve implemented it. So There.

In the early development of iHTML (1996), Wadge and Yildirim envisioned parallel documents similar to Nelson’s Parallel Universe. In the first version of iHTML, we could have the same document in French or English or Turkish, blue or white, graphics or no graphics, and thereby we could render an incredible number of possible documents with very little effort.

These documents maintained their current state information from one link to the next. Any attribute could be changed at any time. The document could shift from blue background to red at any time. This is document versioning: Not simply making different pre-existing document versions available to be viewed in polar views as Nelson imagines, but actually rendering non-pre-existing versions on the fly. Indeed, the notion of a pre-existing (extensional) document is of limited utility under the intensional vision.

So the crux of the problem is that Nelson dreams of versions, but thinks only extensionally.

Again, with Intensional HTML, there is no Extensional document, or series of extensional documents. There are only versions available to be rendered as instances of the version space.

Leading up to the second revision of iHTML in 1998, in 1997, schraefel refined the notion of intensional HTML documents by postulating three extensions to iHTML. These extensions were degree of detail — discussed further in the collection Putting Hyper back into HyperText — depth, and aggregation.

These extensions allow intensional documents to be rendered not only by parallel content (the same content in French, English or Turkish), but structurally as well. For instance, Degree of Detail may be set at the Executive Summary; and Expertise may be set at Expert level. This might only render one page for the given topic, whereas were the Degree of Detail set to Detailed Overview and Expertise set to Novice Level, then five pages might be rendered.

A smaller refinement within these extensions was the ability to apply these versioning elements locally, rather than only globally. One component of a document — what schraefel called document chunks — can be rendered at Expert level, while another component on the page can be set to Novice.

The aggregation extension of iHTML also allows for the on-the-fly collecting of appropriate components for a given version. For instance a bibliography can be rendered
according to criteria such as “most important for summary” or “best introductory texts for this topic”.

The development of these iHTML extensions was informed by schraefel’s research into mixed gender communication strategies, in particular, consideration of online interactive strategies (see for example, “Jacking In to the Virtual Self”). In this work two textual interactive strategies became apparent: first, onscreen communication is at its best, most involving, when it is interactive, when the source reacts to the user’s queries. This can be seen in chat room conversations, especially those among women, where conversational give and take is more — though not always — the norm than argument, and where one user can pose questions, have another user respond, and then pose a question, and respond, and hear responses. In other words, there is a high degree of apparent listening and responding to questions. The text that results from this conversation is one that evolves intensionally. Extentional posturing is more often the site for flaming, not knowledge making.

Schraefel’s extensions to iHTML were to assist the project in creating documents that could be more responsive to user interaction in this conversational way. The work resulted in the intensional document paradigm schraefel refers to as ConTexts. ConTexts are very different in kind, therefore, from Nelson’s Parallel Documents.

In a ConText space, the goal is to produce a document for the user that will allow the user to gain the knowledge they seek. Think of a conversation you may have with a friend who is very knowledgeable in a topic of interest to you. You may either know a great deal about the field in general, but not this specific topic, or perhaps you have very little knowledge about this topic or its area, but you still wish to grasp the concept. You will have a different conversation with your friend, depending on the background you bring to your question.

Similarly, in answering you, your friend may ask you what you know about Y before proceeding to your question about X, and based on your answer pick the appropriate path to get you to X. Your friend will likely regularly verify with you to see if you understand what is been explained, or if a particular point (which may be again more background rather than directly part of your question) needs to be explained more, and if so at a higher or lesser degree of expertise. Some topics, depending on your own knowledge, may be skipped entirely or simply touched on.

This is the kind of conversational interaction that a ConText attempts to facilitate for the user by providing a way for the user to interact with a document in an ongoing way.

Say you wish to know how digital sampling works. A well-defined ConText document, by which we mean where the dimensional space defined for the intensions of the document is useful, would allow you to say whether, perhaps, you wanted the concept explained to you in “plain language” or whether it could assume you had some engineering or mathematics background. The document version rendered for each part of the explanation would reflect your parameters. If the explanation hit a point that was not clear to you, the document would explain that point as well in further detail at the appropriate level, and with the amount of detail useful to you.

This kind of give and take with a document is far more truly interactive (conversational) than Nelson’s static parallel views. Nelson’s view is ultimately so static because it is extensional in nature and patriarchal in approach to the Object of the Gaze. ConTexts
are so interactive and responsive because they are intensional, and are not dominated by a phallocentric paradigm; quite the opposite, they deliberately make room for heterogeneous interaction, rather than presuppose a desire for homogenizing synthesis, at the root of Nelson’s proposal. Both points, intensionality and real-time heterogeneity, are important in terms of the continued development of ConTexts as a paradigm for digital document rendering.

4 Intensional Hypertext

If Ted Nelson’s view is fundamentally flawed, then what should replace it? One way to summarize Nelson’s view is that he wishes to relate two extensions, while we wish to relate two intensions. This means that a link between two intensions may well lead to thousands, millions or even more links between potentially generatable extensions.

The implication of this insight is that links themselves must be intensional, i.e. links vary according to their own specific dimensionalities as well as according to the dimensionalities of the documents they relate.

In addition, there should be nothing special about the number two. Any number of relevant extensions should be presented, as needed, i.e. when a particular version is requested, the aggregate of all of the relevant versions should be provided. This approach was first proposed in Schraefel’s Ph.D. thesis, *Talking with Antigone*.

But how should aggregate versions be presented? Quite simply, by versioning the presentation. Depending on what is required, presentations might be textual, graphical, audio, video, etc., or some combination of these. The members of the aggregate might be presented “side-by-side”, or might be superimposed (layers), or might be fused into a single extension, etc.

However, to be able to have versioned presentation, it is likely that access to the internal structure of the extensions will be necessary. This is not currently possible with the basic object-oriented paradigm that forms the basis of the Web. The Intensional Object approach solves this problem quite elegantly. Since objects are no longer hard-shelled upopenable entities with a fixed interface, but, rather, labelled boxes that can be opened or relabelled, accessing the internal structure of an entity becomes a possibility.

5 Response to our reviewer

Because the point of view presented in this paper is controversial, and given the fact that this is not the final paper to be published in a book, we have decided to retain the original submission and to respond directly to the review of our paper here, in order to stimulate further discussion at the symposium.

Our reviewer states that we have overstated our case against Ted Nelson, and that “it’s smarter for us to consider him a resource, a source of raw ideas which intensionality allows us to make precise and implement”. That is precisely the goal of this paper. Ted Nelson’s ideas are at times brilliant, but they remain flawed. It is only through an in-depth critique of his work that they can really be used to full effect.
The reviewer goes on to quote from Ted Nelson’s *Dream Machines* (1987, Microsoft Press, p. 66).

Thousand-track branching recordings are imaginable. It is as though the listener could wander in an orchestra, first hanging out near the brasses, then the violins. But carry it further: New sections, themes and melodies could be accessible. This new genre could be like wandering through a forest of music — music that never stops, but that changes with every movement of the listener through a fancic (sic) space. Whole new themese are just over a hill. And the beginnings of other sounds beckon the listener even onward.

Clearly when Ted Nelson is dreaming, we feel wisps of intensionality. However, when he tries to bring these ideas into focus, the dreams disappear into the nebulous reaches of cyberspace. For example, in his Web page on parallel universes, he writes

(http://www.sfc.keio.ac.jp/~ted/TN/PARALUNE/paradoxx.html):

Maintaining, intercomparing and working with connections among parallel versions and coupled texts is what the hard document work is really about. This is what computer document work must be set up for.

What role does the author play? How does the author create content, in particular, content with complex structure? Is that structure just window dressing, which can at any moment be superseded by the structure of some new reader/listener? If so, then our original critique is fundamentally correct.

Now Nelson has also written about authorship, and proposes that it correspond to filling-in-the-blanks in an n-dimensional space.

(http://www.sfc.keio.ac.jp/~ted/LUSTR/LUSTRpage.html),

LUSTR, or Level of Universal Structure, is a proposed definition language for highly-interactive, multidimensional flying objects. The author begins by carving n-space into the structures that make sense, then painting text, colors and textures onto surfaces in that space. “Text formatting” becomes a spatial structure in this surface mapping — rather than the gnarly system of embedded codes used by HTML and its parent SGML.

These things are possible with IHTML, but much more. The key is the ability of the author to define the versioned links — particularly the relative versioned links — that allow different links to be followed depending on the context. It is not just a question of “stretch-text”, nor of moving up and down a few levers on a mixing machine. As these levers move, the entire structure may change....

There is another key aspect which is implicit in the aggregation of ConTexts: the possibility for multiple-source input, for the document to be alive, in the sense that new authors may be continually adding to the corpus of text that makes up the complete set of versions of the entire document. It is not just the reader/listener who is interacting, it is also the document and those creating it.

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6 Conclusion

It has been stated that the invention of the Web is akin to the (re-)invention of the printing press by Gutenberg, as it allows for the collaborative creation of new works. However, we argue that the Web in its current status does not allow for truly interactive, collaborative hypermedia, and, more importantly, *nor does Ted Nelson's vision.*

However, our notion of Intensional Hypertext does provide the necessary support. In the full paper, we will give many historical and foreseeable examples, and show — in a technical sense — how these can be implemented using Intensional Hypertext. We intend to include a richer, more detailed critique of Ted Nelson as well.