

Simplifying Annotation Support for Real-World-Settings – a Comparative Study of Active Reading

Hartmut Obendorf

Applied and Socially Oriented Informatics

Department for Informatics

University of Hamburg

obendorf@informatik.uni-hamburg.de

ABSTRACT

Despite the multitude of existing interfaces for annotation, little is known about their influence on the created annotations. In this paper, first findings of a comparative video-supported study of active reading are presented. The support for active reading offered by traditional paper-and-pencil vs. two existing annotation tools for the World Wide Web is examined and possible implications for annotation systems are drawn.

An immediate conclusion is the existence of a strong need for simplicity and the importance of generic tools that can be adapted to the user's task at hand.

General Terms

Design, Human Factors

Keywords

Annotation, User Study, Active Reading

THE MOTIVATION FOR ANNOTATIONS

Human created meta-data might be crucial to the success of advanced hypertext features, such as sophisticated linking and parts of the Semantic Web, as machine-generated meta-data alone might not be able to provide a major qualitative difference to the search engines used to locate information today.

Annotations as an important human-readable kind of meta-data have long been a feature of hypertext systems. There have also been a number of attempts to implement annotations for the World Wide Web (e.g. ThirdVoice, crit.org). However, these developments have only had very limited impact. Apart from technical reasons, such as the dynamic nature of the Web, this can also be explained by the unwillingness of users to help create annotations without a clear *benefit* for themselves.

Annotations have long been closely connected to the question of *typed links* [8] and thus a central part of the hypertext discussion. Often, they have been seen in the context of *scholarly work* [e.g. 1], where revising and commenting on other work is common, and thus the need for an exact typing was high. But, as the designers of Aquanet state [5], the *strictness* of the annotation mechanisms prevented people even in technical settings from making use of types.

Previous Annotation Studies and Prototypes

Marshall analyzed the annotation of used study books on a university campus [4] and collected data on different types of annotations. Wojahn [10] investigated effects of different interfaces for annotations. Computer support for annotation in

the context of active reading was previously observed to fail in [6], comparing annotations on paper and a word processor.

In the study described here, the focus was kept on the annotations created by the participants and the tools they used. The computer setting was optimized for similarity with the paper condition and quite similar to the XLibris prototypes [7], but there were two important differences: Hardware and software were freely available – and it was important for the created annotation to be adequate for *further processing*. Thus, free-form ink annotations were not considered.

The Tools Used For Annotation

The *Webnize Highlighter* was developed to support student work and is currently in use at the University of Århus. It allows highlighting a selection, which is then marked with a yellow background and by blue text with underlines. The annotations are listed with their beginning words in a sidebar and the annotation appears as a popup when the mouse is moved over the mark. *Annozilla* allows only textual comments; the user must also enter the type and language of annotation. The annotations show up as pencil marks at the start of marked paragraphs, and as a list (latest first) of items in a sidebar. The text of an annotation is only shown in the sidebar when a list item is clicked upon.

STUDY: AUTHORIZING ANNOTATIONS

To gather information about the different use patterns of annotation for the task of active reading, an observatory laboratory study with an artificial, but realistic task was conducted. Seven participants, one female and six male, being students of either media science or computer science, took part in the study. They were from 21 to 27 years old; their mean age was 23.7.

The participants were given three chapters of “Understanding Computers and Cognition”¹ [9]; one in paper form, the other two as HTML pages on a tablet PC². Using Annozilla and Webnize Highlighter, they could make annotations while reading the texts. For each chapter, they were required to give a short oral summary³ after they had finished reading.

To identify problems, the participants were asked to think aloud. After the tasks had been completed, information about

¹ The text was chosen on the grounds of a previous reading study [4] that had found that the complex argument contained in this text would call for annotations.

² The tablet PC platform was chosen to minimize the obvious differences between a desktop PC and the paper-and-pencil combination. Although hardware-specific problems surfaced in the study, they are not focused upon in this paper.

³ As the participants were Danish and the author German, they were asked to use English, which they all spoke fluently, for verbal comments; annotations were mostly made in Danish.

annotation habits, preferences and problems observed during the study were collected using a guided interview. The entire session was recorded on video, and – during the second and third task – the action on screen was captured as well. An interaction log was used to identify interesting passages. A first analysis reveals interesting patterns:

RESULTS: OBSERVATIONS

Several different results indicate that the paper was a much better reading device than the tablet PC with either annotation tool. Not only was the mean number of annotations much higher in the paper case (annotations on paper: 25.0 ($\sigma=12.9$), Webnize Highlighter: 10.7 ($\sigma=6.5$) and Annozilla: 4.0 ($\sigma=2.3$)), the summaries were also far better in quality for the first task. All participants stated difficulties with the annotation tools and felt strongly distracted from the main task. Also, in the paper condition, the participants made frequent use of the annotations as reminders to structure their presentation, a strategy that completely failed in all computer-supported tasks.

Only a surprisingly limited range of tools was employed in the paper condition: although the participants had the choice between a number of colored pens, highlighters in different colors, post-it notes in various sizes, pens and rulers, their tool of choice was the pencil: six out of seven participants used the pencil for taking notes, three of these used a yellow highlighter in addition and one used only the highlighter. Although the number of tools used was extremely low, no two participants employed the tools in the same manner.

This flexibility of use was lost when computer-supported annotation was employed; while the Webnize tool only poorly supported a highlight-only mode, forcing the participants to enter an annotation text for the highlighter region, and, more problematic, the node as a whole (the participants could not do this as they were in the process of understanding the text, and they were far from manufacturing a publishable annotation). The Annozilla tool allowed only for typed text input without an immediately visible indicator where the text belonged.

The lower number and the limited usefulness of computer annotations can only partly be explained by a smaller resolution, interaction problems (text input, scrolling) and the expertise of using pen and paper for reading. While observing the participants, it became visible that they tried to transfer their behavior from paper to the computer. Two phases were present in all experiments: 1. Failure of this transfer: the computer supported different uses of annotation than the users were expecting. 2. Adaptation to the tool: workarounds were developed to still be able to use the computer as intended, e.g. one participant copied part of the text into an Annozilla annotation to “highlight” it.

Participants’ Statements

The participants were willing to trade in some of the flexibility they had on paper for an “orderly” appearance promising reuse.

The exactness of placing side markers to text was not very important for the participants. However, if the spatial reference was lost altogether, as it happened in Annozilla, an important quality of the annotations was felt to be lost.

The quality of comments was very mixed, very much depending on the previous experience of the participants. Interestingly, the form of the annotations seemed to closely follow the quality of annotations: two participants, who had read the text previously, made far less highlights, found a matching structure earlier and created more references to other work.

All participants liked the ability to highlight phrases to make quick annotations for personal use; none wanted to publish these annotations without further refinement (compare [2]).

Highlighting was preferred over note-taking by all participants, they were unwilling to annotate a text page as a whole, as they were just about to discover what it was about. The note-like annotations in Annozilla were perceived to (1) be something different (often comments) and (2) not support active reading, one participant explicitly asked for paper instead.

CONCLUSION

Although the study will have to be interpreted in more detail, a first consequence is surfacing: simple annotations tools should be made available to facilitate personal annotation.

The gap between annotation that is immediately useful for the annotator and annotation that is usable for the rest of the world has been noted before [2], but it is very obvious here in the context of active reading. Still, the participants all expected the system to create additional value out of their notes. Beginning with the clear formatting of notes, also more advanced processing, such as automatic bibliographies or interactive construction of an argument, was asked for.

As spatial hypertext keeps the user in control of *when* he wants to add *his* meaning to his spatial arrangements, annotation facilities should allow the users to decide *when* they want to continue to work with their annotations. Simple highlighting or note-taking activity could be taken advantage of when constructing meta-data of lasting value to the individual user, or even a group of users.

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