

Codex Redux: Books and New Knowledge Environments

Claire Warwick
UCL SLAIS
Gower Street
London, UK, WC1E 6BT
0044 1223 515429
c.warwick@ucl.ac.uk

Ray Siemens
Faculty of Humanities
University of Victoria
Victoria, BC, Canada V8W 3W1
001 250 721-7272 .
siemens@uvic.ca

Stan Ruecker
Department of English & Film Studies
University of Alberta
Edmonton, AB, Canada T6G 2E5
001 780 492 7816
sruecker@alberta.ca

The INKE Group*

ABSTRACT

In this paper, we present the work of the INKE (Implementing New Knowledge Environments) research group, a large international, interdisciplinary research team studying reading and texts, both digital and printed. The INKE team is comprised of researchers and stakeholders at the forefronts of fields relating to textual studies, user experience, interface design, and information management. We aim to contribute to the development of new digital information and knowledge environments that build on past textual practices. We discuss our research questions, methods, aims and research objectives, the rationale behind our work and its expected significance.

Categories and Subject Descriptors

H. Information Systems; H.5 INFORMATION INTERFACES AND PRESENTATION (e.g., HCI) (I.7); H.5.2 User Interfaces (D.2.2, H.1.2, I.3.6); H.1.2 User/Machine Systems; Human information processing

General Terms

Design, Human Factors, Theory

Keywords

Text, Interface, Prototype, Reading, Book

2. INTRODUCTION

This paper presents to work of the INKE (Implementing New Knowledge Environments) research group, a large international, interdisciplinary research team, including 35 academics from 20 different institutions. We have come together to study different elements of reading and texts, both digital and printed. The INKE team is comprised of researchers and stakeholders at the forefronts of fields relating to textual studies, user experience, interface design, and information management.

We aim to contribute to the development of new digital information and knowledge environments that build on past

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textual practices. We have already articulated a foundation for identifying the characteristics of digital interfaces that respond to the expectations and needs of a broad constituency of professional, personal, and lay readers. The following paper presents the rationale for our research, and its aims and objectives.

Our work provides functional reading interface prototypes that have the potential to transform the way we engage with the digital materials that comprise our personal and professional reading. To do this, our *Textual Studies* research responds to the need for understanding further what components of existing textual artifacts are essential to represent in new digital objects and reading devices; our *User Experience* research identifies characteristics of user engagement with print and digital environments; our *Interface Design* research focuses on extending continuous reading and scholarship involving digital environments through interface; and, through iterative processes involving all research groups, our *Information Management* research builds prototypical digital reading interfaces that promote active reading patterns and draw on dynamically integrated collections of supporting materials.

3. RESEARCH OBJECTIVES

We aim to combine the traditional strengths of print with the advantages of the computer to produce integrated digital reading environments that take full advantage of the technical possibilities of the electronic medium. We seek to:

- document the features of previous textual forms as the context for implementing new knowledge environments;
- advance our understanding of how reading texts and using information is affected by digital, multimedia delivery;
- conceptualize new knowledge environments, and develop tools to produce accessible, flexible information architecture; to extend user control and/or affordances;
- to implement new visual metaphors and integrate social networking functionality;
- to create dynamic interface prototypes for new knowledge environments.

The prototypes represent a complex of foundational textual forms, comprising most professional and personal reading environments: the *scholarly edition*, such as those of the Internet Shakespeare Editions (ISE) and the Bibliothèque du Nouveau Monde (PUM), among others; the *academic monograph*, such as

Du papyrus et hypertext (Vandendorpe); *poetry and creative fiction*, as represented in the Electronic Literature Organization (ELO) collections; and the *scholarly journal and essay collection*, such as those of the Public Knowledge Project (PKP) and the Blackwell *Companion to Digital Humanities* (eds. Schreibman, Siemens, and Unsworth). These prototypes encompass a wide range of further text types: a digitized work (originally created in print); a born-digital work (created entirely in digital media, with no print source); a work with complex interpretive apparatus; an interactive work; a highly encoded work; works in different file formats; a Web-based document; work(s) in different genres; work(s) in French and English; and a dynamic document.

4. RESEARCH QUESTIONS

4.1 How has reading changed since the rise of digital media, and how can the history of textual practices inform the future?

To answer this question we must strive to understand “the human presence in *any* recorded text” [1], combining close, granular study of material artifacts with interpretive inquiry into human activities [2]. The same techniques of close reading and rigorous material study, long applied to print and manuscript, need to be extended to digital artifacts and online knowledge environments in all their multimedia forms [3]. We will combine the study of print and digital texts to develop a technical vocabulary to describe the features of digital texts by which we define in the most inclusive sense of the word, including electronic literature, multimedia and video games. This vocabulary and its theoretical underpinning informs the work of the entire project, such that our prototyping activities take into account the material transmission of all such artifacts (manuscript, print, and digital).

4.2 How has our experience of information changed since the rise of digital technologies and the Internet?

Reading is the key intellectual and cultural foundation of literate societies, and the fundamental activity of scholars; yet, we have little knowledge of how the way we experience information is modified in new media environments [4]. In the early- to mid-nineties, humanities scholars expressed excitement about the possibilities of digital text, predicting that the experience of reading and information access would change fundamentally as a result of digital delivery and the integration of media such as sound, images and video [5]. However, was not based on systematic research with users. Although there have been a number of user studies from the perspective of interface design and software engineering, and several with readers of scientific literature [6], little progress has been made in understanding how digital media may affect the way that readers of humanities literature and multimedia artifacts experience information, both printed and digital.

4.3 What new features can we design to improve digital information environments, and their interfaces, based on our knowledge of user needs, behaviours, and cultural contexts?

Theoretical models for representing textual material are in

their early stages and do not fully accommodate the visual and logical dimensions of texts. The process of reading involves understanding not only the logical structure of content, as the Text Encoding Initiative (TEI) structure emphasizes, but also the integration of visual information provided by typography and the disposition of text [7]. The layout of the text may help reading and visual memory, as one’s ability to retrieve information depends in part on spatial cues consistent from one act of reading to another [8]. Given the emerging possibilities offered by new media, it remains to vital understand and develop methods and models to:

- extend reader control of digital texts;
- develop and test prototypes that address issues raised by the printed page metaphor,
- merge reading culture with prototypes of social software;
- rethink genres of print material and examine emerging born-digital genres.
- give readers and researchers better control of their activities

We aim to achieve this final objective by for example: revisiting the notion of page boundaries; devising experimental visual tools related to the scrollbar; designing advanced means of bookmarking; and implementing new digital metaphors that may derive from sculpture or visualization rather than the codex book; and exploring possibilities for parallel displays and related tools [9].

4.4 How can we better design, or process, the data that underlies and serves the needs of those using digital information environments?

The chief research challenge for archives or large corpora of texts is to provide means of organization and access to a radically expanding and heterogeneously formatted body of materials. The chief research challenge for individual artifacts is to provide contextual information for producers and consumers of dynamic reading environments. Our research combines the best of several knowledge management strategies: the speed and power of the search engine; deep textual-analysis methods used by the scholarly community; consistently encoded corpora in specific knowledge domains; and detailed user-recorded results provided by “Web 2.0” tools social networking technologies.

5. RESEARCH METHODS

Our interdisciplinary program of research is organized around the convergence of four interrelated approaches, each represented by a group focusing on that area of inquiry: Textual Studies, User Experience, Interface Design, and Information Management. Together, our research activities fall into a number of key sub-areas with associated methodologies, as below. The section below describes work that is proposed but has not yet begun, and thus we are not able at this stage to provide extensive detail about research methods, since we have not yet had chance to apply them. Rather we present the types of approaches that we plan to apply to solve the problems articulated above.

5.1 Digital Textual Scholarship

To understand how digital textuality will affect practices associated with the engagement of materials in new media, the Textual Studies group will document the features of past textual

forms and practices to provide the vocabulary and theoretical framework for implementing new knowledge environments. In this context we will go beyond the type of digital text analysis often used by researchers in stylistics and corpus linguistics to analyse the linguistic features of a text. We will concentrate instead on the phenomenology of texts and the study of how they relate to their social milieu. The emerging field of Digital Textual Scholarship conceives of its materials in broad terms that encompass artifacts like scrolls, newspapers, transcriptions of oral folktales, photographs, small-press periodicals, poems and plays in manuscript, electronic literature, video games, multiple versions of films, and unpublished archival materials. The Textual Studies group brings several approaches to bear upon all manner of human artifacts, digital and analog:

- *book history's* interest in books as primary mediators of human relationships [10], and in the book as "the text" on a human scale;
- *bibliography's* focus on print material as physical, machine-produced vehicles of abstract texts [11];
- *literary theory's* sensitivity to the complexities of form, content, and materiality in all linguistic mediation [12].

Digital textual scholarship also involves an anthropological understanding of texts as "the universal human work of weaving or fabricating with words" [13], as well as a psychological understanding of texts as artifacts embedded in cognitive networks of attention and memory [3].

5.2 User Experience Evaluation

The User Experience group will study the complex processes involved in engaging with materials in print and digital environments. We will derive requirements for, and subsequently test, prototypes developed by our Interface Design team. We will conduct studies with individuals engaging with humanities artifacts in a variety of contexts and for various purposes. These artifacts may include different types of content, including alphabetic language, icons, sound or images. They may be straightforward or complex in structure; and may contain marginalia or annotations. Each of these variables may modify cognitive and affective response, as demonstrated by empirical user studies in digital environments [14]. Humanists read in many different ways, adopting different physical stances and mental attitudes dependent on the formal properties of the text and the object of the reading enterprise (e.g., whether it is for pleasure or study) [15]. They also appear to be affected by feelings about physical environments [16]. Any study of individuals engaging with such materials should therefore take into account the complexity of the enterprise and employ multiple methodologies.

Qualitative user studies, employing a use in context approach will involve observation, interviews, think aloud protocols, and analysis of user journals and diaries. They will follow an holistic user experience approach [17], whereby participants engage in authentic tasks in natural environments, employing both printed and digital information. We will undertake these studies in collaboration with research partners such as the Internet Shakespeare Editions, Public Knowledge Project, and the Electronic Literature Organization.

5.3 Interface Design Prototyping

The Interface Design researchers will develop a variety of innovative interfaces to allow readers to work with digital

artifacts. Our primary medium will be the Internet, but we will share with our User Experience and Textual Studies groups an investigation of output devices such as e-paper, handheld devices, and wall- or desk-mounted touch screens, each of which affects the process of reading or viewing.

To develop prototype interfaces, we will follow a research life cycle that begins by building on insights from our colleagues in User Experience and Textual Studies. The Interface Design group will create concept sketches for iterative review and feedback by research participants. Next will come interactive prototypes to give the users access to the test-bed data. Members of the Interface Design group have previously been responsible for over a dozen interactive prototypes [18].

Our proven design method includes direct user participation, with users consulted at every stage in the process. We will develop and test a series of interface sketches and small prototypes that will converge into a larger working environment. Our test-bed artifacts will fall into the four groups identified above, namely the scholarly edition, the academic monograph, the scholarly journal and essay collection, and forms of electronic literature. Our final goal is to complete the series with an integrated application that emerges from the process.

5.4 Information Management

Our objective is to provide ways for users to organize and access the expanding and diversely formatted body of digital material in ways that best serve the needs of users. To this end, we will develop the informational underpinnings for four prototypical digital reading environments. We will establish collections of contextual materials for dynamic reading and viewing. We will also build corpora pertinent to our reading environments, in English and French, through our research partnerships – with EEBO-TCP, ISE, Proquest, ELO, Synergies, CRKN, PKP, University of Alberta Press, OTA (Oxford Text Archive), PUM (Les Presses de l'Université de Montréal), – and through automatic harvesting of content and associated metadata. Corpora will be housed in several knowledge management systems, for example Fedora, and we will ensure that documents can be used in different information systems, (this will involve partnerships with ebrary, Transliterations, and the Canadian Association of Research Libraries). We will adapt and create processing and analysis tools to navigate large corpora, integrating TAPoR (Text Analysis Portal for Research) tools and social networking tools (noted above), and tools to serve individual reading processes. We will also apply data-mining techniques (text clustering, automatic categorization based on machine learning algorithms, entity extraction, etc.) to assist the reading of digital documents using thematic maps, and may be adapted to reading digital documents in the humanities and social sciences.

6. CONCLUSION

This paper has presented the rationale for the plans that the INKE research group has for future research. We hope that together we will be able to make significant contributions to the field of ebooks and online reading, and look forward to discussing our ideas in more detail in future.

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