Hypertext in Art (Literature)

Master thesis

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By this I declare that I wrote this master thesis by myself, only with a help of the referenced literature and internet resources, under the supervision of my thesis advisor.

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Bratislava, 2006 Jana Heršková

Acknowledgement

I would like to thank Dr. Veith Risak for guidance during writing this thesis.

Abstract

Task of thesis

Hypertext is mostly used for information systems, manuals, e-commerce, electronic teaching, etc. Because of its general associative and hierarchical structure it would be interesting to find out, how hypertext is used in Art, concretely in Literature. The scope of the work will be to find out and make a review how authors of novels with nonlinear structure, poems with rearrangement, etc. use hypertext techniques.

The task of thesis is to find out which tools are available on the markets and how compatible they are with the web.

Next, there will be given a review of the most common literary structures that are possible to make with hypertext.

Finally, there will be a summary of who and how uses these techniques for literary purposes. It would be good to find relevant sources and critical analysis of the best known literature works and make a review of them.

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Introduction

The first chapter describes the most important people and organizations in the branch of digital literature. Vannervar Bush, Theodor Holm Nelson, Espen Aarseth, George P. Landow, Jay David Bolter, Michael Joyce and Jom Rosenberg are those who, in a big range, contributed to the establishment and constant development of using the hypertext for writing literature. Next, two organizations are mentioned there, Electronic Literature Organization and Eastgate Systems, that make good advertisement to electronic literature and also contribute to its distribution.

The second section of the work depicts the history of hypertext. Since the beginning of hypertext systems this area was closely linked with a literary art. The most significant sign of this connection already arise from the name of publication "Literary devices" written by Theodor Nelson. The author, in this field, introduced a known project Xanadu, which is considered as the forerunner of all hypertext systems.

The third part is about the theory of hypertext literature viewed from two sides. As a first one, the formal definitions that are used in the theory of graphs and in information technologies are described. From these definitions of graph, tree, and hypergraph directly arise the representation of hypertext system. The next part of the definition is extracted from the theory of literature. Since the Espen Aarseth' theory in cybertext is generally accepted and widely used, also a part of this work is dedicate to this subject. Besides all, the basic sorting of digital literature can be find here.

In the forth capitol the introduction of hypertext systems, their basic parts, areas in which they are developing, and sorting according to the platforms, are described. Some of the most frequently used hypertext systems are explained more deeply.

The fifth section offers a summary of the most frequent methods of using the hypertext techniques. There are shown some illustrations and specific examples for better understanding of these methods.

The sixth chapter describes Project Gutenberg that was developed in an attempt to declassify the pieces of work, originally published in a paper form, now in a digital

form to the largest amount of audience.

The seventh part of this work is dedicated to selected digital literary works that are accessible on the Internet. These works are usually displayed in the basis viewer and they mostly use the functions of the viewer.

In the eighth section there is a description of works, which were created by the hypertext system as separate applications, included. Usually, the works in this section are commercially sold, primarily by the Eastgate system company. Since the price of these works overlaps the financial budget of this project, there was no possibility to explore and describe them. Due to this fact, this section gives an opportunity to another project with a bigger financial support to realize.

In the ninth capitol is summary of those works that are available on the Internet. They can be read in standart web browser.

The tenth capitol includes a list of the most common reasons why the public hold either positive or negative relation to the electronic literature.

The last – eleventh chapter devotes the future view of the hypertext literature. It also includes a proposal for possible future development of the hypertext systems used for writhing literary works and the improvement of the works themselves.

At the end of this project, there is a list of used literature.

1 Figures of hypertext literature

Vannervar Bush was an American engineer, science administrator, a professor on the of Electrical Engineering and a director of the Office of Scientific Research and Development. He is an author of the project Memex that is considered to be as a pioneering concept for all hypertext systems. Actually he was one of the most important American scientists during World War I and II.

Theodor Holm Nelson is an American sociologist, philosopher and visiting professor at Oxford University. He is an author of work *Literary Machines.* He introduced the terms "hypertext" and "hypermedia" there.

Espen Aarseth co-founded of the Department of Humanistic Informatics at the University of Bergen works there as a professor. He is currently Principal Researcher at the Center of Computer Games Research at the IT University of Copenhagen. He is author of the work *Cybertext: Perspectives on Ergodic Literature*, which introduces the concept of ergodic text and also contains a well-known theory "typology of cybertext".

George P. Landow is a Professor of English and Art History at Brown University. He is an early Electronic literature critic and theorist, as well as a pioneer in the analysis of hypertext and hypermedia. Landow is a well-known author, researcher and one of the most important thinkers concerning Hypermedia and Hypertext in academia.

Jay David Bolter held a number of different professor positions at the University of North Carolina. Since 1991 he works as a professor of Language, Communication and Culture at the Georgia Institute of Technology and Director of the Institute's Graphics, Visualization, and Usability Center. Bolter is a co-designer and programmer of Storyspace, hypertext writing software.

Michael Joyce is a professor of English at Vassar College. He is a coauthor of the Storyspace and also an important author and critic of hypertext fiction and electronic literature. His best-known works are Afternoon. A Story. and Twilight. A Symphony.

Jim Rosenberg is one of the most important figures that deals with technical features and literary appropriations of hypertexts. He does not consider himself to be a fiction writer, but a programmer and a poet. In his article *Interactive Diagram Sentence: Hypertext as a Medium of Thought* he tries to take hypertext to the lowest levels of language. He is talking about the Nelson's idea, the need of conjunctive hypertexts, where several links can be used simultaneously.

1.1 Electronic Literature Organization

Is a nonprofit organization established in 1999. It has grown to be a vital part of the electronic literature community. The scope of the organization is to promote and facilitate the writing, publishing, and reading of electronic literature. Since its formation, the Electronic Literature Organization has worked to assist writers and publishers in bringing their literary works to a wider, global readership and to provide them with the infrastructure necessary to reach one another.

1.2 Eastgate Systems

It is the pioneering company that first publishes (on disks and, later, on CD) and distributing literary hypertexts managed by the early 1990s to create a kind of “local” scene for hypertext writers. The published writers include authors and critics as Landow, Moulthrop or Joyce.

2 History of hypertext literature

First idea of hypertext was called “Memex” and was developed by Vannevar Bush. Bush described Memex in 1945 in his article *As we may think*, that was published in Atlantic Monthly. Bush didn't use the term 'hypertext', but he developed the idea of hypertext machine and that's why he is commonly considered to be 'father of hypertext'. It was based on combination of a large data base with possibility to link different parts of that data base to each other. One can start to read a Memex document and continue by using link and access the associative reasoning chain which was behind that particular document. In Memex, user is allowed to link together different documents, to gather links to named paths, to add new documents to the database and to return to the database and follow the previous paths. This is the main issues also in hypertext environment as we know it today. Because the article war written before the electronic computers was developed, Memex was mainly mechanical in function and was not based on digital technology. That's why this idea soon became obsolete and was never constructed. Bush accepted that that realization will not be exact because of technology is developing, but the important thing was actually the idea.

At the end of the 1966, Advanced Research Projects Agency (ARPA) of the United States Department of Defense, started to connecting computers by packet switching network called ARPANET, the first one on the market. At the beginning, computers was connected to each other by telephone cables. Then ARPANET widely expanded and became an international network to finally form the Internet. With the formation of global net new opportunities not only for communication and exchange of information were created.

Theodore 'Ted' Nelson in his book *Literary Machines* came up with the terms “hypertext” and “hypermedia” and described project Xanadu, firstly published in 1982. Xanadu was based on Memex idea in new electronic form. A main difference was that Memex was a local machine and Xanadu was a global system. Nelson puts strong emphasis on hypertext as a literary concern. In his book he wrote that Project Xanadu is

an initiative toward an instantaneous electronic literature. He termed the networked computers as a “literary machines”. As well as some of other hypertext project, this one also was not implemented to general usage. However, the idea to build a global network was implemented and concretized in the most famous hypertext system World Wide Web (WWW).

WWW was invented in 1990 by Timothy John Berners-Lee and had overshadowed all other hypertext systems built earlier. It is the global information space, from which can users read, write into it and access it with devices that are connected to the Internet. It contains the complete set of the documents that are stored on all Internet servers that uses HTTP protocol.

The interactive fiction had started to spread through the web as the adventure games called MUD's. They were text based and multiple users were allowed to play the same game simultaneously and also talk to each other. The playing game was early faded or totally discarded. The communication became the main aim of the games. By this way the electronic texts accessible on the Internet started to be formed. Since this time, the Internet and browsers have rapidly developed and enabled the use of multimedia technique when writing the electronic literature.

3 Theory of hypertext literature

3.1 Definitions

In the mathematics **graph** (*Illustration 1*) is defined as an ordered set of two disjoint sets G=(V,E), where V is a finite, non-empty set of vertices and E is a set of the edges between them. When the edges in a graph have no direction, the graph is called **undirected** (*Illustration 3*), otherwise called **directed** (*Illustration 4*). A **path** in a graph is a sequence of vertices such that from each of its vertices there is an edge to the successor vertex. The first vertex is called the **start vertex** and the last vertex is called the **end vertex**. Both of them are called end or **terminal vertices** of the path. The other vertices in the path are **internal vertices**. A **cycle** is a path such that the start vertex and the end vertex are the same. Notice however that unlike with paths, any vertex of a cycle can be chosen as the start, so the start is often not specified. A **tree** (*Illustration 2*) is a graph in which any two vertices are connected by exactly one path. A **forest** is a graph in which any two vertices are connected by at most one path. A **hypergraph** is a generalization of a graph, where edges can connect any number of the vertices. Formally, an hypergraph is a pair (X,E) where X is a set of elements, called nodes or vertices, and E is a set of subsets of X, called **hyperedges**. While graph edges are pairs of nodes, hyperedges are arbitrary sets of nodes, and can therefore contain an arbitrary number of nodes.

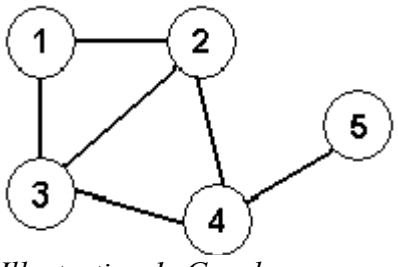

Illustration 1: Graph

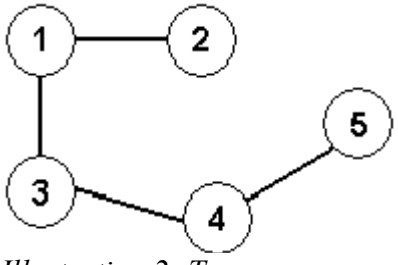

Illustration 2: Tree

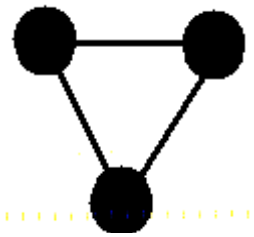

Illustration 3: Unordered graph

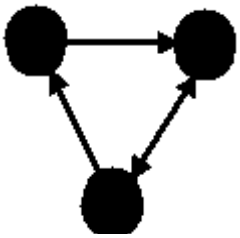

Illustration 4: Ordered graph

Directly from these definitions arise those used in computer science. Graph is an abstract data type that consists of a set of nodes and a set of edges that establish relationships (connections) between the nodes. In practice, some information is associated with each node and edge.

Hypertext, in computing, is an user interface paradigm for displaying the documents. The hypertext document contains the references to the other documents. The references are called **hyperlinks**. Selecting the link causes that computer displays connected document in very short time. Document could be static (prepared and prestored) or dynamically generated. Documents can be local or can come from anywhere from the computer network. The representation of the hypertext is a hypergraph. User while reading the hypertext, traverses hypergraph through one path from the beginning to the end of it.

In the literary theory the individual 'text chunks' are usually called, depending on the context, either nodes, vertices, pages, frames or workspaces. Landow borrowed from Roland Barthe's essay *S/Z* term '**lexia**' and incorporated it into hypertext theory. When dealing with the Macintosh-based HyperCard environment, the term '**card**' is used, while in the WWW the highly misleading term of '**homepage**' is employed.

Link or edge is a connection between any two lexias. **Anchor** is a term closely related to link. An anchor is the exact place in a lexia to which a link is attached – that is, the starting or ending point of a link. The basic types of the links are **default** and **alternative**. Reader follows the default link when he continuous reading the lexias successively one by another. When reader chooses next lexia by clicking on the link, he chooses alternative link. It usually leads out of the actual lexia. It can be represented by

word or there can be included a list of the links. Hypertext with lexias, default and alternative links represents three dimensional network.

According to the originator of the change, changes can be categorized as **chosen** and **caused**. Chosen changes happen when reader chooses link he wants to follow. Choosing the link causes change in hypertext (usually the change is semantic).

Nelson defines **hypertext** as "non-sequential writing – text that branches and allows choices to the reader, best read at an interactive screen. As popularly conceived, this is a series of text chunks connected by links which offer the reader different pathways." This definition has been used frequently but nonsequentiality seemed to be problematic because after reader's selection, the result is a linear text. Today, in hypertext theory, either the term "**non-linear**" or George P. Landow's terms "**multilinear**" or "**multisequential**" are used better then "non-sequential". These terms has been widely accepted.

3.2 Cybertext and ergodic literature

In general, the hypertext is considered to be as narratives. This is a huge mistake for Aarseth. He defined new separate category and named it as '**ergodic texts**'. In this literature "nontrivial effort is required to allow the reader to traverse the text" (for example in digital literature there is a need to use alternative link, in print literature the book must be turned around to read the text written in the circle). Following the lines by "eye-movement and the periodic or arbitrary turning of pages" (using only default links, no need to use alternative link) is considered as a 'trivial effort'. Aarseth also came up with the term '**cybertext**' and in contexts with that also '**texton**' and '**scripton**'. Cybertext comes from the word cyberspace that assigns virtual reality "in" the computer and "on" the computer network. Cybertext is name for functions that clearly do not belong to the area of hypertext, so hypertext is just a subcategory of the cybertext (*Illustration 5*). Textons are blocks of text (all the individual lexias/nodes together). Scriptons are all possible combinations that textons could create by any connection.

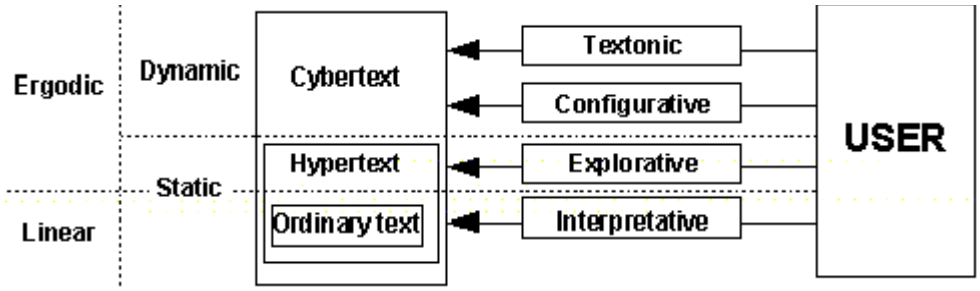

Illustration 5: Division of the literature

Aarsetch says that the cybertext reader is a player and the cybertext is a game-world or world game. It is possible to explore, get lost, and discover secret paths in these texts, not metaphorically, but through the topological structures of the textual machinery. Not every hypertext literature theorists agree with Aarseth's theory of cybertexts and ergodic literature, but his book *Cybertext. Perspectives on Ergodic Literature.*, published in 1997, is considered to be the first systematical approach to digital literature. In cybertextual meaning, the text is understood to be a machine in concrete sense. It doesn't make a difference between printed and digital texts, so also printed text could be cybertextual. In spite of that, the main focus is on digital text because it serves more flexible opinions to design textual functioning. Second important fact about cybertextuality is, that it does not focus only on the literature but also on computer games.

Aarseth formed different types of text according to several variables:

1) dynamics: static (scriptons are constant), intratextonic dynamics (the number of textons is fixed, scriptons may change), textonic dynamics (the number and content of textons may vary)

2) determinability: determinable (the same response to a given situation will always produce the same result), indeterminable (the results of responses are unpredictable)

3) transiency: transient (mere passing of user's time causes scriptons to appear), intransient (scriptons appear only through user's activity)

4) perspective: personal (requires the user to play a strategic role as a character

in the world described by the text), impersonal (reader is not involved as a participant)

5) access: random (all scriptons are available to the user at all times), controlled (some scripton is available only when certain conditions are met)

6) linking: explicit, conditional, none

7) user function: explorative, configurative, interpretative, textonic

This classification is based on analysis of real text so it is not only pure theoretical study. Seven categories are not definitive. They may vary due to next development and also there are many texts, which are hybrids of these categories and doesn't fit to any concrete one.

Special sense has user function, as it is formal naming to function that is usually called interactivity. User has several opportunities how to interact with work. Aarseth categorized these opportunities:

1) Interpretation (part of the role of the user reading any work, ergodic or non-ergodic)

2) Explorative function (choosing one possibility of all available to navigate through parts of the document)

3) Configurative function (changing texts or linking between them in the personal copy of the document)

4) Textonic function (writing new text to the document, changing or deleting existing text)

3.3 Fiction

Anthony Niesz and Norman N. Holland published the article "**Interactive Fiction**" in Critical Inquiry (1984). Through this article they brought this term to public notice. It talks about software that describes simulated environment in which the players use text commands to control the characters. The work in this form could be seen as a

literary narratives (the text adventures, types of adventures with text input/output etc.). Wider definition could also refer to the graphic adventure games. **Hypertext fiction** is genre of the electronic literature, mainly the on-line, that is characteristic by using the hypertext. It allows non-linearity and interactivity. User usually chooses the links to jump from one node to another and thus creates the story from available stories.

3.4 Categorization of digital literature

Digital literature can be divided into few categories, such as Raine Koskimaa scathced it in his work *DIGITAL LITERATURE – From Text to Hypertext and Beyond*:

1) Digitalization of printed literature. (For example, Project Gutenberg.) These projects conserve old, physically deteriorating texts and rare works (existing only in one copy) and made them available for the larger public.

2) The digital publication of original literature. Digital form of this literature is primarily used for the distribution of the text. (The device that is used to read electronic version of the book is called e-book.)

3) Literature using the new techniques. This category includes everything from hypernovels to interactive poetry and multimedia encyclopedias. (First hypertext novel written by Michael Joyce, *Afternoon. A Story.* was published in 1987.)

4) Networked literature. (For example, *Interface* by Markku Eskelinen.) This literature is using the special features made possible by the Internet.

5) In addition, there are special types of digital text that cannot be really called literature but to which a variable extent includes literary aspects (narrative structures, fictionality), especially computer games, simulations, MUD's, IRC, virtual realities etc.

4 Hypertext tools and literature

4.1 Developing hypertext system

Each user has his own vision about how to access the data and how to work with the system. In other words, there is general notion that graphic user interface will be perfectly suited for certain user. This notion originate from expectations in domain in which the actual user works. The hypertext systems are often designed to be general, not only for certain purpose.

Hypertext system has three main segments:

1) Base of the documents. There are sets and subsets and logic relations between them.
2) Search mechanism. The best known search mechanisms are string or keyword search. They can be automated. Expert systems are stronger (this approach is often criticized because expert systems navigate user through series of questions without explanation), smart filters and interactive interfaces. Generally it is held that more complicated the database structure is, the simpler is searching mechanism, and vice versa.
3) User interface that is interface between the user and document base, most commonly it is graphical.

Techniques in the hypertext area are still evolving to achieve higher effectiveness and better usability. Besides other, the hypertext systems import also techniques that are developed in artificial intelligence. These areas are very similar. However, one of the main differences is that hypertext offers dynamic platform to process the data and the artificial intelligence tries to achieve human knowledges in a way that they can be used by machine.

There are two ways how to use search techniques developed in Artificial Intelligence to Hypertext Systems:

1) first one uses algorithmic approach – system of the database management or system with support of the decision making;

2) interesting are those expert systems that offer intelligent interface to the document database.

Representation of the knowledges in Artificial Intelligence is designed to work with a small amount of instances of a larger amount of classes and types in background. Databases are highly structured. There are many ways the expert systems could join with hypertext to achieve development of the intelligent hypertext system. Nodes could be anything from the text to the procedures. To add intelligence of an expert system, knowledge base and inference engine are needed. There are three ways how to conjoin expert systems and hypertexts:

1) Knowledge base is separated from a hypertext system. Knowledge base with inference engine is placed between the user and hypertext system.

2) Conjoining of the knowledge base and hypertext system. Expert systems were criticized because they offer little or non explanation to the user through the series of questions. There is software called Knowledge Pro which overruns this problem. It is expert system designed as an hypertext.

3) Distribute expert systems in hypergraph. This approach combines two techniques mentioned above. Expert systems will be placed through the hyperweb and this will allow the user to call another connected expert systems. This could mean that small knowledge bases would be connected like other modules in the web. The case that one expert system calls another expert system will lead to the higher functionality and flexibility.

The hypertext systems could be packaged according to the information structure that is used as follows:

- Card-based systems operate in full-screen without the scrolling option, so the size of the node is fixed and the text have to fix to the screen. It is based on the cue card or the slide show. Examples of the card systems are

HyperShell, HyperTies, HyperWriter! or Orpheus. The most famous card system is HyperCard. It does not exactly fit into this group because it has rich interface functions, such as scripting language. Another HyperCard-like systems are SuperCard or ToolBook.

- Document-based systems are focused on text editing and formatting the simple documents. They are often expanded on the word-processors and are not optimized on non-linear writing. The examples are FrameMaker and Guide.
- Windowing systems provide rich user interface that allows using more scrollable windows. Users can compare two sides of the text or write notes during reading. Examples of the windowing systems are VIEWS, SmartText, Knowledge Pro or Storyspace.

Following is the list of hypertext systems mainly used to writing literature. The list is organized according to the environment under which they run:

- Linux: Guide
- Windows: Guide, FrameMaker, Knowledge Pro, SmartText, ToolBook, Storyspace, Inform 7
- Apple: Guide, FrameMaker, HyperCard, Storyspace, Inform 7

4.2 E-books

Electronic/digital version of the book is called e-book. By this term we can determine a work in a digital format but also a hardware device that is dedicated to read a books in digital format. Limited case of the data in ASCII text format is called e-text.

The e-book can be published in many formats. Each of the format has its advantages and disadvantages. Many of the formats are specialized and many times proprietary. The most common, that don't need any specialized hardware or software, are:

- Hyper Text Markup Language (HTML) is used by most web pages and it can be read by standard browser.
- Portable Document Format (PDF) was created by Adobe Systems as a standard form for storing and editing the printed publishable documents. It can contain interactive features such as buttons, forms or triggering sound or AVI movies.
- PostScript (PS) is page description language that is mainly used to describe the content of the printed page.
- Image format is used for distributing the pages of the e-book to sequence of images. Disadvantage is that these files are very large and the text can't be selected.
- TeX is popular academic format, because complex mathematical formulas can be written in it.
- Mobipocket reader (published as a .prc) is a complex reader with many features. It runs on Windows2000/XP and on many PDA types.
- eReader (Palm Digital Media published as a .pdb) shows one page at a time like a paper book does. It supports hyperlinks and images. Available version are for PalmOS, PocketPC, Symbian OS, Windows, and Macintosh.

4.3 Guide

The Guide is the first hypertext system designed for personal computers. It was originally built for UNIX system by Peter Brown in 1985. Later on, company OWL in Edinburgh extended Guide for PC's and Macs. The biggest asset of Guide were expansion buttons and common environment for reading and writing the document. It supported pop-up's for small commentaries that behaved like following the link in hypertext. It won British Computer Society award for innovation.

4.4 HyperCard

This hypertext tool was created by Bill Atkinson in 1989 and distributed free by Apple Computer. Since 1991, when it transferred to Apple's subsidiary company Claris, it became a paid product. In 1992 Apple stopped selling HyperCard.

It is based on stacks of virtual cards. Every card has fixed length and text that must fit in the screen. The stack background contains elements that are displayed on each card of this stack or on each card based on certain background. Backgrounds could contain graphic and another standard GUI elements like pictures, static or editable text areas, buttons etc.

Scripting language, called HyperTalk is also available there. It is assigned to buttons and it allows to write commands in readable English, for example "**put the first word of the third line of the field 'hello' into the field 'goodbye**'". The numbers could be represented numerically (1, 2), as a cardinals (one, two) or ordinals (first, second). The external command (XCMD) or external functional module (XFCN) could be integrated to the system or to the HyperTalk language. It is very slow because it is interpreted language. It need only 1 MB of RAM for running.

This tool was used for writing every type of hypertexts with educational and art purposes, for presentations and for simply databases and adventure games.

HyperCard inspires authors of SuperCard to use the Roadster plug-in that was used to import stack into the Web page and display it by browser. There is also Windows version of this plug-in.

The authors of HTTP and Java Script were inspired by the HyperCard. Its popularity fell down with expansion of World Wide Web. It was so popular and widely used that it motivated many other authors of hypertext tools and it has many descendents as a SuperCard which is also stack based.

4.5 Knowledge Pro

This is not hypertext system at all, there are no navigational functions. It combines expert system, programming language and hypertext product. It serves functions for hypertext, list processing and interface design. It is built upon the Object Oriented technique in C language. There are two versions of this product, for DOS (KPDos) that works only in text mode and for Windows (KPWin) that implements multiple scrollable windows. KPWin is pretty slow because it is an interpreted language. It generates the code that is compilable in C/C++ compiler. Dynamically data exchange, low-level calling and other features are available. It supports graphics, video, video discs and database.

It is not assessed to the standard users, because programming is necessery for application built in it.

4.6 Storyspace

This tool was made by three literary theorists Jay David Bolter, John B. Smith and Michael Joyce. It was designed specially to create literary hypertexts with dominance of the text. It is not necessary to know any programming language, nor the HTML. The writing works in the same form as reading in the Reader. The difference is that the author in the writing mode has a possibility to open multiple windows at the same time but in the Reader this possibility does not exists. The products could be created as a stand-alone applications or they could be exported to the World Wide Web. It allows creating texts with rich decision structure.

Maps that represents this structure and separates it from the implementation details could be made here. Each node (in Storyspace, the term “writing space” is used) is represented by box and each link by an arrow (*Illustration 6*). Each item on the map could be manipulated (copied, cut and pasted).

The hierarchical structure of the writing spaces is allowed. It means, that one

writing space could contain one or more writing spaces. Besides that, it could contain text, graphics and music.

The links adapt and change their behaviors with the reading process of each reader. Author can make condition in text by using “guard fields” that assign condition to any link. In this case the link is activated only if condition is fulfilled.

This makes the link available in one moment and unavailable in another. This also makes the illusion that text is potentially changeable and the reader is able to change the structure of the text. However, all changes are preplanned and the structure of the text is stable. There can't be made something that wasn't planned by author during creating the document. The user doesn't have a power to remake or reprogram the work according to his imagines.

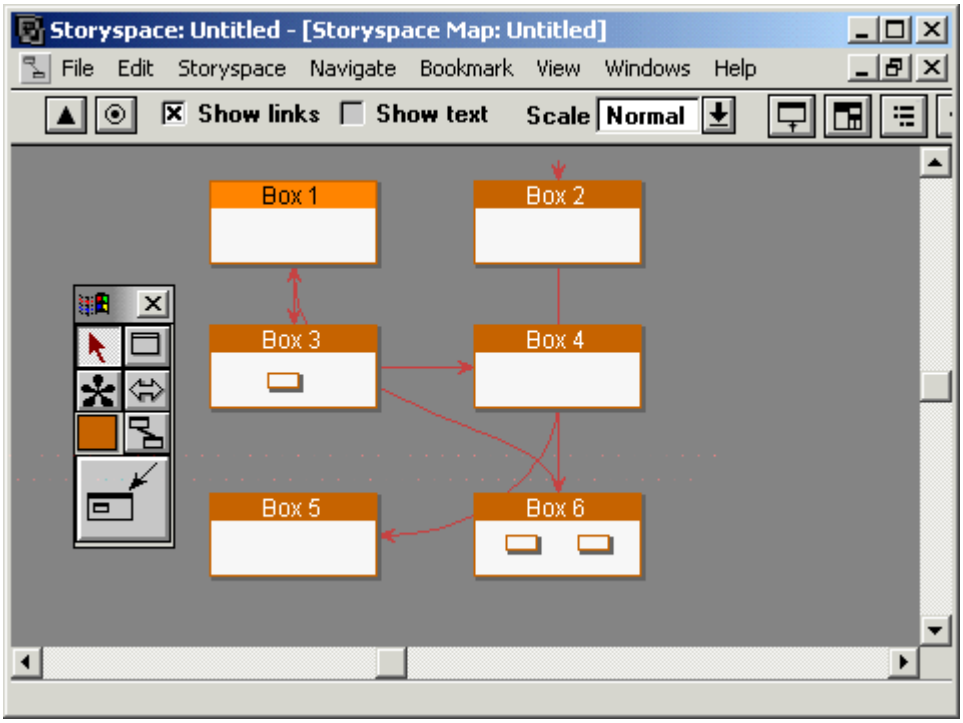

Illustration 6: Screen shot of the Storyspace

System allows only one way to construct the navigation system (*Illustration 7* and *Illustration 8*).

Illustration 7: The toolbar from Shally Jackson's Patchwork Girl

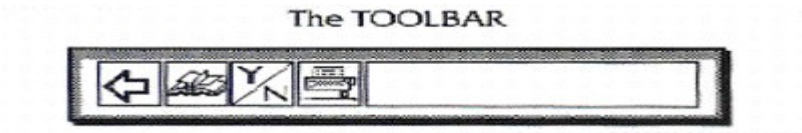

Illustration 8: The Toolbar from Michael Joyce's Afternoon. A Story.

4.7 Inform 7

It is a hypertext system (*Illustration 9*) that was created by Graham Nelson especially for writing hypertext fictions. It is based on natural language. The file created in Inform 7 is in a format with .blorb extension and it can be read by wide range of readers under various platforms. So it is an independent platform.

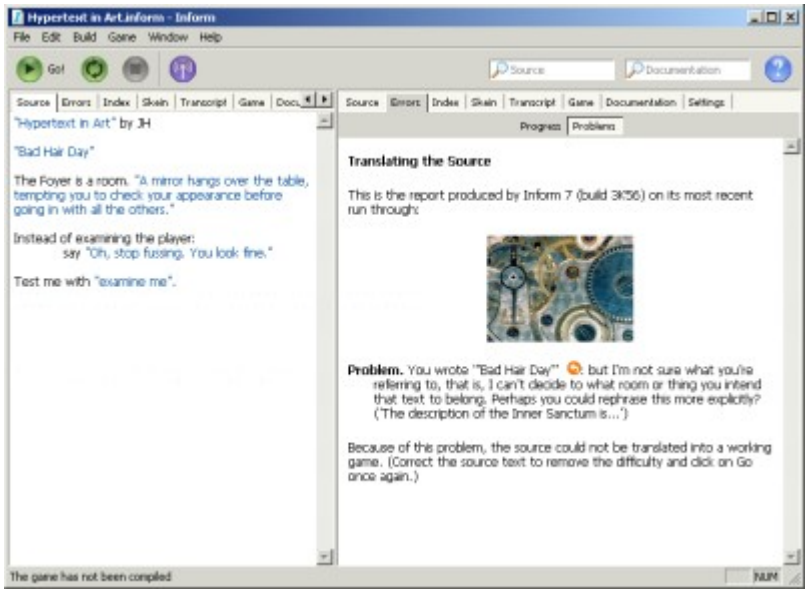

Illustration 9: Screen shot of the Inform 7

4.8 The Electronic Text Composition Project

It is a project introduced by Jim Carpenter, where users can generate their own poetry. This software is created in ASP and suited for the Internet. It is free software, but the source code is available in a little curious form. It is re-conversed and placed in .cs sonic format.

5 Hypertext usage in literature

5.1 Interactivity

'Interactivity' is a highly problematic term in regard to literature, since all literature, is interactive. We can talk about the following reader(/user) functions:

- interpretation and navigation – whien reading any literature, interpretation of the text and navigation through the net of hypertextual paths naturally comes up. The navigation is usually performed by navigation tool (*Illustration 7* and *Illustration 8*). Also, there could be possibility to follow default or alternative link. The default link is usually represented by pressing any keyboard key, most often the Return key. The alternative link is placed to an anchor and usually it is signified with underline or different color. The link could lead to the part inside the hypertext or to the external source. The main problem with the external link is, that when destination changes or is discarded, link is not actual anymore. For example, in Matti Niskanen's *Leporauha* is a placed link that leads to the front page of the *Yellow Press Paper* that changes daily.
- configuration and writing – reader is allowed to configure or even write the text when he can add his own links to the hypertext, respective, when he is allowed to participate in the writing of the text. In very rare cases, when reader is allowed really write text, not only in metaphorical sense, reader becomes an author of work. Here we can talk about cybertext, which is defined as independent on the medium. For example, twice in the year Mark Eskelinen publishes new edition of the *Interface* with new lexias that are written by the readers or the readers inspires the author to write them. Another example is David Benson's *No Dead Trees*. The reader is allowed to add new characters, story-lines etc.

We can consider the printed text to be a cybertext, in a case if offers configuration

and writing functions. On the other hand, if a digital text does not use any other users functions rather than interpretation, then it does not, in any significant ways, differ from traditional text.

5.2 Visual representation

Generally it is held, that the idea is simpler represented by visuo-spatial or iconic representation than by symbols, as numbers or letters. Unfortunately, many hypertext fictions contain very few visual devices. Visual structuring is often made by navigation devices. The presence of visual meaning has impact on the overall look of the text. The more visual devices and more colour used the better usability for user. Failing of visualization is frustrating for the reader.

One of the used visual representations is map. Different hypertexts employ maps at different levels. Sometimes it just shows available lexias, but more often only main lexias and links between them, or there can be also some functionality. For example, reader is able to click at displayed lexia to show its content. Role of the map in the Michael Joyce's *Afternoon. A Story.* and in the Stuart Moultrop's *Victory Garden* (*Illustration 10* and *Illustration 11*) is more symbolic than really representative. On the other hand, the map in the Shally Jackson's *Patchwork Girl* (*Illustration 12* and *Illustration 13*) does not only represent the order of the lexias but it provide this order. There is not just quantitative difference, but significant qualitative.

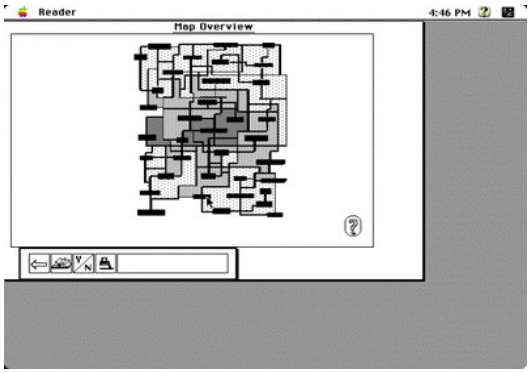

Illustration 11: The navigational map from Stuart Moultrop's Victory Garden

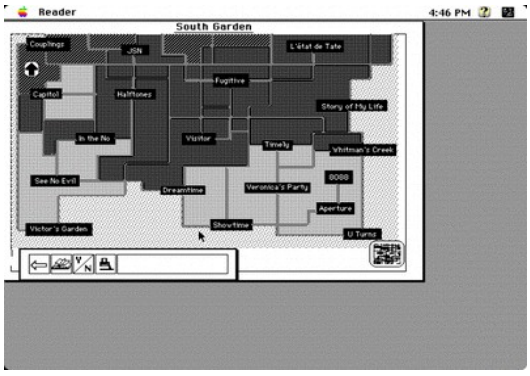

Illustration 10: Detailed map from Stuart Moultrop's Victory Garden

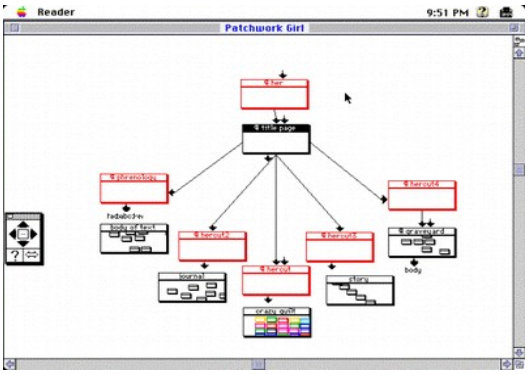

Illustration 12: Representational map from Shelley Jackson's Patchwork Girl

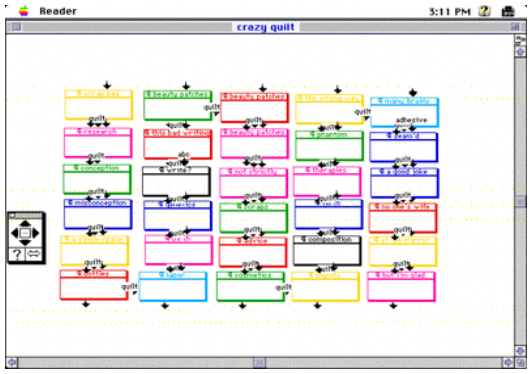

Illustration 13: Detailed map from Shelley Jackson's Patchwork Girl Patchwork Girl

Illustration 14: Tarot Cards from Italo Calvino's The Castle of Crossed Destinies

For the visualization another devices can be used, such as images or iconic representation. Using this techniques improve usability of the system. For example in M. D. Coverley's *Califia* the stars charts are used for navigating in space.

In Italo Calvino's work *The Castle of Cross destinies* (*Illustration 14*) the visual map is represented by tarot deck. The cards are arranged in crossed columns and rows. Each row and each column is a separate story. Stories use the same material but the meaning of each card depends on the actual story.

5.3 Possible beginnings/startings

Default story line – is the basic form of starting the reading. Most of the hyperfiction can be started by following the default link from the title page.

Map – is the graphical representation of all lexias and links between them. It often offers the possibility to click on certain lexia and display content of it. So the reader can start reading in displayed lexia and continue by default or alternative link. For example, the Stuart Moultrop's *Victory Garden* employs this functionality.

List of available stories – the reader can choose one from available story list and then follow it. Usually there is short description of each story available. Although the reader starts its reading in this way, he or she can also follow alternative link and thus leave the chosen story line.

5.4 Manipulating the reading time

Limiting the reading time – it means that the text displayed on the screen will disappear after limited amount of time. In Stuart Moulthrop's *Hegirascope* this time remains thirty seconds. Besides that, there are hyperlinks serves to change direction of the course of the text stream and there are also texts, which can only be read once Another example is *Agrippa* by William Gibson, where text scrolls on the screen and when a line scrolls out of the screen the reader can never return to it.

Delaying the reading time – the reading can continue only when a certain waiting period is running. For example in Stuart Moultrop's *Hegirascope* or Mark Amerika's *Grammatron* the lexias come one after another in certain rhythm. In

Hegirascope, there are alternative links for quick readers.

Restricting the reading period – for example, the text may vary according to whether it is read at day time or night time. There can be also a condition for another part of the day.

The text changing in the time – a digital text is being updated at various intervals. An example of on-line changing text is Matti Niskanen's *Leporauha* with links to the front page of newspaper. The content of the front page is changed daily. Interactive texts with configurative user function change continuously thorough the work of the active audience.

5.5 Conditions

The links that are available only after certain condition is fulfilled. For example, in Michael Joyce's *Afternoon. A Story.* such a links can be found.

Gonzalo's Fracca's web text could be read only when user logs in. Text is different after each login.

5.6 Repeating

Simple loop – simple loop (*Illustration 15*) occurs when lexia is visited for the first time and the default link directs to previously visited lexia. Then reading follows the same path as earlier but when reading reaches the lexia that began the loop, the default link is different and directs to another lexia. This is implemented for example in Stuart Moultrop's *Victory Garden*.

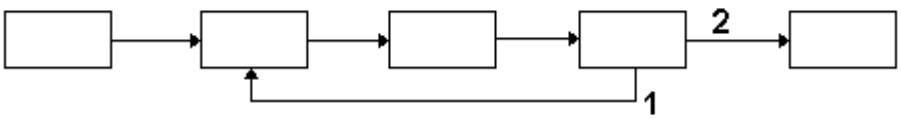

Illustration 15: Simple loop

Infinite loop – in one point of the story the default link returns the reading to the earlier phase of the way. From this earlier phase it continues trough the same way until it again reaches the point from which loop began. The different against the simple loop is that this time the default link is the same as when firstly visited. There could be alternative links that direct out of the loop.

Recursion – is not vice if it doesn't create the infinite loop. This case often happens and the reader could easily get lost in text. If infinity is handled, than recursion can be interesting revival in writing hypertext fiction.

5.7 Possible endings

There is no default link – for example, in the *Victory Garden* pressing the Return key makes only beep sound. There can be alternative links in lexia. For example, in Richard Pryll's *Lies* there are several endings, where each of them tells the reader that the hyperfiction ends and the only link that appears on the last screen is the link to the beginning screen.

Exhaust all possibilities – by traversing all the paths existing in hypertext (by traversing to the deep or to the width) all the possibilities are exhausted, each link and each lexia are visited at least once. However, relatively small amount of lexias and relatively constraint amount of the links between them can make fairly large amount of possible paths through the hypertext network. For example in the *Victory Garden* there are 993 lexias and 2 804 links between them and all possible permutations of the order can lead to a great amount of possibilities. It is not really executable by any reader in a real time trying to reach them all.

6 Digitalization of printed literature

Project Gutenberg is the oldest producer of free e-books on the Internet. The word free means that they are free of charge. It is like this because copyright for these books has expired in the United States or they are copyrighted books whose author gave Project Gutenberg a permission to distribute them. So, anybody may make verbatim or non-verbatim copies of those works. But they may still be copyrighted in other countries. Thus, if one doesn't live in the United States the country's law must be checked before downloading and distributing the e-books.

The books can be browsed by the Author, the Title, the Language or Recently Posted. Another ways to find out some work is to use the database and full text search.

The publications include the works like *The Notebooks of Leonardo Da Vinci* – Complete by Leonardo da Vinci, *The Adventures of Huckleberry Finn* by Mark Twain or *The Adventures of Sherlock Holmes* by Sir Arthur Conan Doyle.

7 Literature using the new techniques

Most of the first literary published works were written by amateurs. Those works included very few hypertext features. Mostly only the possibility to choose one of the several directions that could be followed. They were pure text based. Now in the electronic literature the visual features and multimedia are dominant. The alphanumeric text has turned to be just a one of the elements among many others. The first hypertext fiction was written at the beginning of the eighty's.

7.1 Michael Joyce – Afternoon. A Story.

It is a story about one technical writer who during one afternoon saw crashed car that could or could not belong to his ex-wife and his son. All the possible stories are about father finding his son.

This is the first commercially distributed fiction and it was written in 1987. It uses very little of the visual devices and other navigation tools (*Illustration 16*). Return key passes the focus on the following lexia in the default story line. Some of the words in the text are links to alternative story lines, but there are no signification of these words. Double click on the word in the text activates the alternative link if there is some under this word. The map of the text structure is missing. The only navigation tool is very simple and clearly separated from the text. This tool (*llustration 7: The toolbar from Shally Jackson's Patchwork Girl created in Storyspace, screen shot made by Raine Koskimaa*) considers four buttons. First serves as an backtrack tool to go back to the previous lexia in default story line. This function doesn't have a history, so if alternative link was chosen, this is discarded. Second one opens the list of the links in actual lexia. Third button serves to answer the Yes or No questions in the text. Fourth buttons prints the text on the paper. There is an area into which the user can write answers for questions taken in the text or write the word that could activate link.

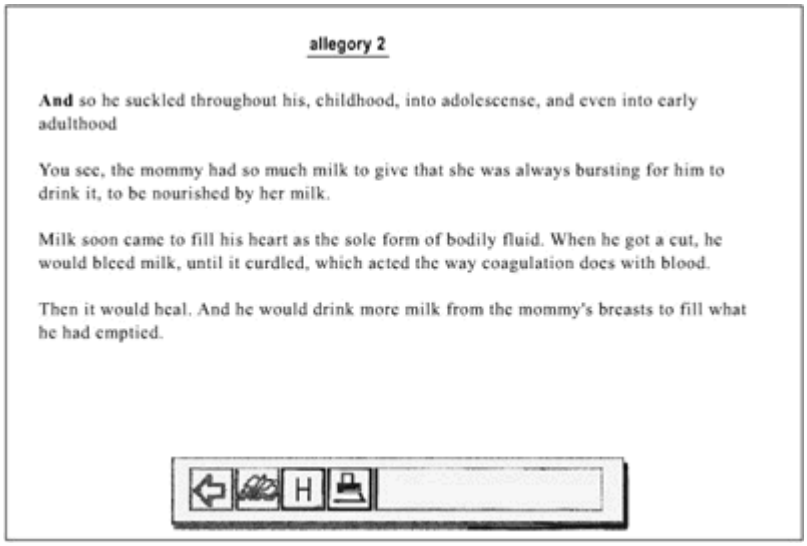

Illustration 16: A Screen from Michael Joyce's Afternoon. A Story.

7.2 Michael Joyce – Twilight. A Symphony.

The story occurs in the heart of Twilight. It talks about erstwhile reporter Hugh Colin Enright, his wife and his son who, on their holiday, met a couple of Polish political refugees and his wife Magda. Years later, Hugh together with ailing Magda, searched for the Twilight doctor; one of the few doctors who practices euthanasia and who could help Magda to end her life.

In Twilight, Joyce covered all things that he, since writing *Afternoon.*, found out as necessary in hyperfiction. It contains also space and conceptual map. One innovation is that two screens open at the same time: the text screen and the map screen. The map allows the reader to navigate everywhere, from one hierarchy to the next. There is a good navigation system that contains a four-headed arrow. The upper arrow takes the story to the superior space according to the actual one, the lower arrow to a space within the actual one, the left-hand arrow to the space that was read before, and the right-hand arrow to the next space. There is also a possibility to save reading and the "dialog box" that appears after pressing the information button and which contains a list of the links leading to and from the current space and a history of the reading in "recently visited spaces". There can be written notes or used bookmarks to mark pages. It includes lot of

pictures, photos, a video of a short film, music and other sounds including human voices. These components are not only decorative but have their own semantic purpose and serve as links to different parts of the story.

7.3 Stuart Moulthrop – Victory Garden

The story is suited to the little university town called Tara during the Gulf War in 1991. It uses the physical imagery of walking through a garden as a parallel for the war. It follows the actual people and events of the war. Literary critic Jane Y. Douglas in *Introduction to Victory Garden* said about this work : "*We could say, that there is no story at all, there are only readings.*"

The user interface is the simplest that Storyspace offers (*Illustration 17*), although the navigation system is a bit more sophisticated as in the *Afternoon*. The toolbar and the function of the Return key are the same and also there is possibility to double click on the word in the text. These words could be highlighted by pressing control keys. This work uses more typographic possibilities of the screen. The only graphics it uses are maps. The visualization of the cognitive space can be found there (*Illustration 10*), but it is not very detailed and so it can't be used as a navigation system. After clicking on particular part of the map, this part is shown in more detail (*Illustration 11*). On the map and detail are not shown all 900 lexias and all links between them. Only most important are chosen. By clicking on the lexia, text it contains is shown. There is a list of the stories with short description from which user can choose one.

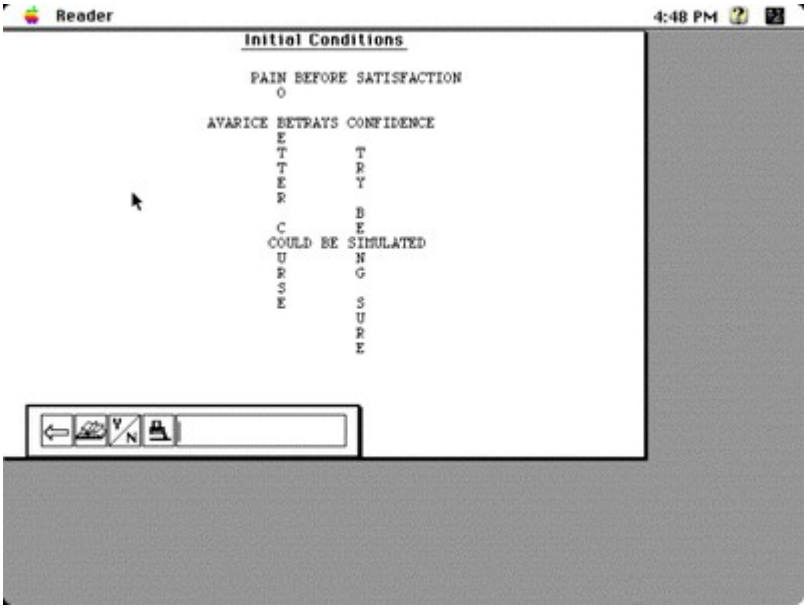

Illustration 17: A screen from Stuart Moulthrop's Victory Garden

7.4 Stuart Moulthrop – Reagan Library

It is web text with using Quick Time VR plug-in. Moultrop creates here 360 degree panorama that can be turn around. Each site has navigation space and text with hyperlinks. The objects can be zoomed in (*Illustration 18* and *Illustration 19*). Each fragment of the text is connected with certain space in virtual country. Due to this spacing is more concrete and navigation more intuitive than in previous work.

Illustration 18: Picture from Stuart Moulthrop's Reagan Library

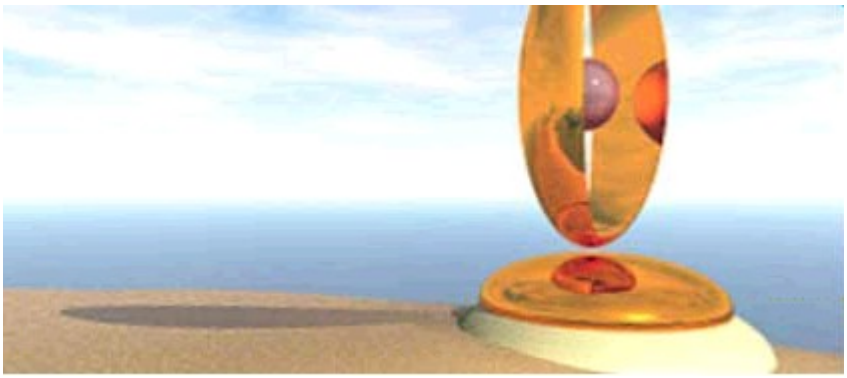

Illustration 19: Detailed picture from Stuart Moulthrop's Reagan Library

7.5 Shelley Jackson – Patchwork girl

This work could be characterized as a postmodernist poetry. It is considered to be one of the most complicated hypertext written until now. It tells the story through illustrations of parts of a female body which are stitched together through text and image.

There is complex navigation system, but the weakness is, that there is mixed space and conceptual functions. Space map is better than in the previous works. It uses illustrations and colors. It is more cognitive then representational map, it displays named boxes and links between them. The map is multilevel. First level contains opening illustration, page with title and main capitols (*Illustration 12*). Each box contains different text constellation. There are also conceptual maps that displays details of constellations (*Illustration 13*). The conceptual map is the active part of the process of reading, so jumping between lexias and navigation isn't so wide (*Illustration 20*).

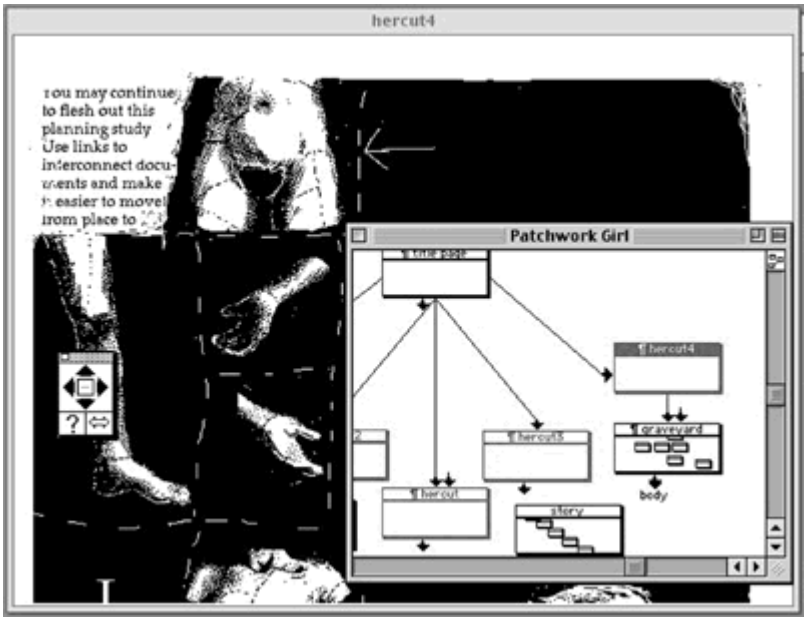

Illustration 20: A Screen from Shelley Jackson's Patchwork Girl

Toolbar (*Illustration 8*) contains button with three dots, four arrows, two-sided arrow and question mark. Three dot-button allows user to choose if the text or the map screen will be displayed as uppermost. Down arrow passes the reading one level down in the structure and up arrow passes it one level up in the structure. Left respective right arrow passes the reading one lexia left respective one lexia right in actual level without taking into account the linking. Two-sided arrow passes the reader one lexia forward in the default text line and together with the Alt key pressed, to the lexia last read. Question mark displays all links that direct to the actual lexia, all links that direct from the actual lexia and another information.

7.6 M. D. Coverley – Califia

It is the story about the treasure finding. It is about the life of the three families during five generations. Three main characters undergone four ways and try to expose their history with many mysterious and find family treasure.

Coverley is trying to create virtual reality with using symbolic signs and stars maps (for example Big Dipper or Ursa Major) (*Illustration 21, Illustration 22, Illustration 23* and *Illustration 24*). There is large amount of the related material such as historical stories, myths legends, documents and newspapers. They can be read in any order and several navigation devices can be used to read them (compare maps, seek the contracts and business papers, look over the pictures in new window etc.). There are also many references to materials that are accessible in Los Angeles Public Library and author recommends the reader to read them. At the end reader is invited to submit his own experiences with the reading.

Illustration 21: A Screen from M. D. Coverley's Califia

Illustration 22: A Screen from M. D. Coverley's Califia

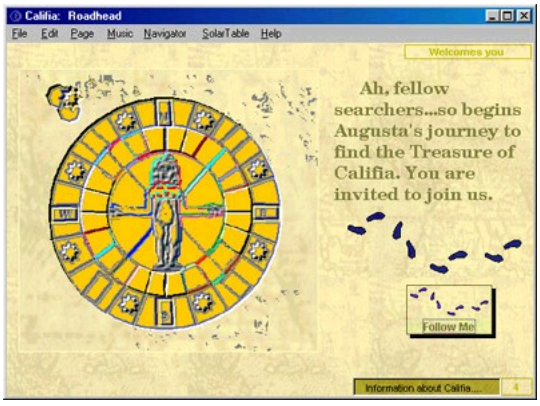

Illustration 23: A Screens from M. D. Coverley's Califia

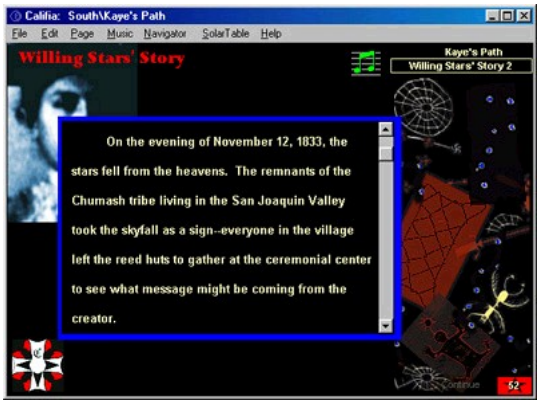

Illustration 24: A Screen from M. D. Coverley's Califia

7.7 Vladimir Nabokov – Pale Fire

This poem is constructed of three separated parts – Foreword, extensive Commentary, and Index . The text rows are numbered and in the commentary there are anchors with the numbers that refer to the text rows. Reader always has to make a decision if to read each part separately or to jump between three parts during reading when needed. This is considered to be a nontrivial effort, so Pale Fire belong to ergodic literature. Pekka Tammi said about *Pale Fire* that it is a game with the words, just like Aarseth defined it.

7.8 Julio Cortazar – Hopscotch

This text consists of 155 chapters. There are many ways of reading it, but two are the main. One starts at beginning, continuous in normal way and ends at chapter 56. The second starts at chapter 73 and at the end of each chapter the number of following chapter is written. With regard of this work, we can clearly talk about the navigation, not only about a decision.

7.9 Philip K. Dick – Ubik

Story is based on existence of infinite parallel words. Story is about a young girl, Pat, who can return to the past and change it. That causes butterfly effect and changes also present. Pat's father can see the future. Story starts when Pat's father tells Pat that a week later she will crash the vase. This really happens, so Pat starts to concentrate on not letting the vase to be crashed. Few days later Pat finds the vase in one piece but nobody around remember that it had ever been crashed. Pat begins to use her ability to travel between realities.

8 Networked literature

Web works usually use lots of graphics, colors and sounds. As they are placed on the Internet, they are readable in any browser and mostly use the browser functions.

8.1 Caitlin Fisher – These Waves of Girls

It is a story about adolescence from the view of a four year old, a ten-year old, and a twenty year old girl.

This hypermedia novel won the Fiction award by Electronic Literature Organization.

8.2 Richard Pryll – Lies

It talks about a relationship between a man and a woman that is complicated by infidelity, lies, and half-truths.

Each page contains links for TRUE and FALSE (*Illustration 25*). The reader, by choosing one of them, easily gets the sense of the richness of possible interpretations. The navigation is simple and the story is short. The work serves as a quick introduction to different possibilities available through the hypertext.

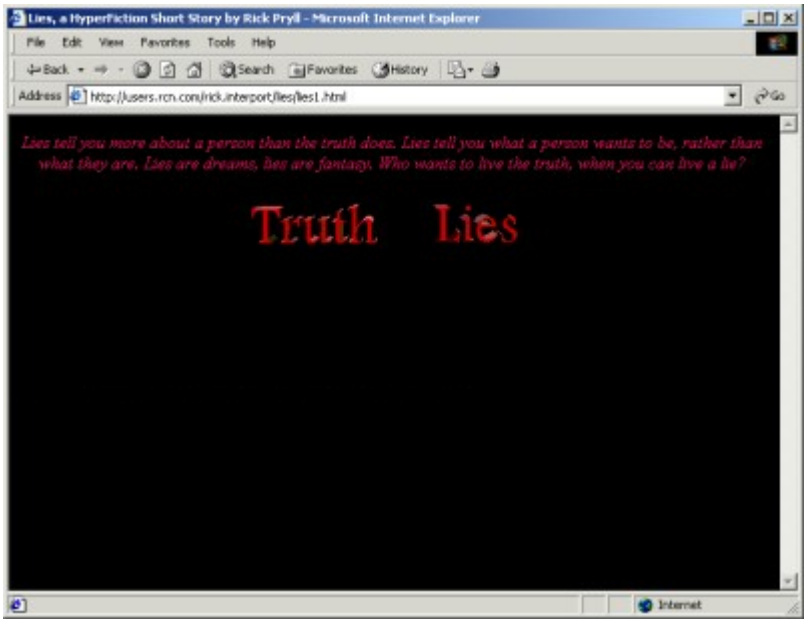

Illustration 25: A Screen from Rick Pryll's Lies

8.3 Carolyn Guertin – Incarnation

It is a hyper-linked "walk" through a maze of language with accompanying music and graphics.

8.4 Jennifer Ley – Daddy Liked His With Heart

Web text, which uses animated images and midi tracks to explore stereotypes associated with the word "heart."

9 Other types of art with use of the hypertext

9.1 Adventure games

The first adventures were text based and to the player they offered several alternative ways of proceeding through textual environment (I*llustration 25*). In practice it means solving different kinds of riddles and problems. There was usually only one successful way to go through the game. A big portion of the adventure games were based on The Lord of the Rings style fantasy, to some extent on science fiction, on mystery and on detective stories. They keep up their devotees for a quite long time despite the development of highly graphical action games. Some of them were highly evolved from both sides – their structure and text.

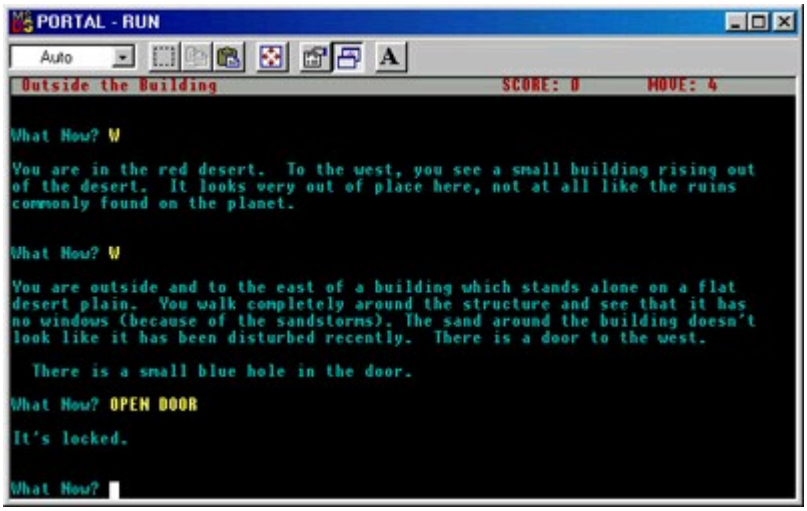

Illustration 26: A Screen from Michael Detlefsen's The Star Portal

Jana Horáková, in her work *Hypertext — Index a symbol postmoderního diskurzu; Počítačová hra jako postmoderní divadlo; Performance art v kyberprostoru — postmoderní fůze vědy, technologie a umění*, is talking about the meaning of the hypertext in the modern culture. She is concerning on the computer games, which are

the one of most important part of the technoculture as the result of the connection of the hypertext and the culture. She describe the computer game as the device to express the postmodernistic approach that allows existence of many different expositions, opinions and definitions without tendentious to their hierarchisation. At the same time, she categorizes the adventure games to be one of the theatre genres, concretely as the "performance art" or the "action art". The main common element of the computer games and performance art is interactivity.

9.2 Criticism

The hypertext found its exploitation also in writing of the criticism, expecially the film-criticism. When the writing critique by using the classical paper form, the main problem arises with showing examples. It takes too long for critics to describe the subject of their critique. With the hypertext authors can insert short movie to work and thus easily illustrate the analysed aspect of the film. They can concentrate on the main theme of the film or on the marginal ideas that support or evolve it.

10 For and against

The electronic form of the literature has, instead of printed books, its advantages and disadvantages. The main advantages are: text can be searched,

- encroach little space,
- can be read in low light,
- can be used as text-to-speech software,
- error can be easily corrected with downloadable lists of errata or simply with corrected text.

When talking about disadvantages we can mention these ones:

- reading can be hard for (or even harmful to) the eye,
- lacks the quality of a print book as an item,
- can restrict how many times a document is read
- and can restrict printing.

Mark Bernstain in *Where are the hypertexts* describes the reasons for not reading the hypertext. Among those seasons these can be included:

- twitch of the screen,
- love for the books
- or higher price.

The reasons such as that the electronic text is not readable in vanie and that it will disappear (fall into the lethe) the author considers as standpattism and tries to shows that they are anachronism and in today's word already out of topicality.

11 Future of the hypertext literature

The hyperfictions have started their way in the same time as the MUDs and the adventure games. The number of MUDs and adventure games expanded widely as well as their style and count of users. In spite of that, development and the count of hyperfictions stayed at very low level. Their publicity was almost none. Also the development of the tools for creating hyperfictions in comparison to the development of the tools for creating web pages was, and still is, very low.

Some authors are worried that change of the formats, software and medias could cause that electronic literature will only hardly achieve next generation. For books that has their audience this won't be so hard. But works that are not so known will be harder to retain.

One of the main problem is in user interaction. People usually want to participate on creating the hypertext by some active form. Sometimes they export the text, reorder, add or delete the lexias or the links. This causes change of the hypertext structure. After that, new hypertext is created. This is considered to be hacking or cracking. But creating of the new reading experience is according to the definition of the hyperfiction. Thus author should enable the reader to change the structure of the work and redo it according to his own imagination. The intervention into the work structure will not be considered as its disturbance but as its improvement.

Mark Bernstain, in his work *Where are the hypertexts* describes also the reasons of why the hypertext in the art is spreading so slowly. He talks about a list, which Frank Halasz introduced as seven issues for the next generation of hypertext systems at the fist hypertext conference in 1978. They are:

- Search and Query,
- Composites,
- Virtual Structures,
- Computation in/over hypertextnetworks,

- Versioning,
- Collaborative Work,
- Tailorabilit.

Bernstein permits that these seven reasons are still actual and also adds other areas in which the hypertext techniques can still be improved. They are, for example, insufficient resources for static but mainly dynamic hypertexts and the hypertext reactions that could be intelligent.

Many researchers deal with connecting artificial intelligence with the hypertext and still finding better and better approaches. For example, simplifying the questioning or improving the structure of the knowledge base in expert system could be good way. Many improvements are concerned with maximizing learning of the network or with improving searching in Pathfinder Associative Networks. This area is still in evolution and it still will be for a long time. Thus, during that time better and better techniques will be found and they will also be implemented in writing the hypertext literature. This approach gives the author certain amount of the freedom. When the system does some of the decisions alone, the fiction could be more sophisticated and then more interesting for the reader.

Conclusion

The mail aim of this work, which was to find and make more transparent the most usable hypertext resources, their possibilities, but also the concrete usage of hypertext techniques in the best-known hypertext works, was managed. The given view is not definite and there is still a space for its spreading. Sources that were used in this work are freely accessible on the Internet. Since many, mainly the most interesting works and critics are commercially sold, there was no possibility to come out directly from the read work or directly find out the used techniques. The screen shots from these all these works are made by Deena Larsen and Richard E. Higgason or Raine Koskimaa. They are all available on the Internet. The freely accessible criticisms had to be used. It would be interesting to buy some copies and directly explore the works themselves.

Hypertext v umení (v literatúre)

Najvýznamnejšie osobnosti v oblasti digitálnej literatúry sú Vannevar Bush, Theodor Holm Nelson, Espen Aarseth, George P. Landow, Jay David Bolter, Michael Joyce a Jim Rosenberg. Významnou mierou prispeli ku vzniku a stálemu rozvoju využitia hypertextu pri písani literárnych diel. Organizácia elektronickej literatúry (Electronic Litrerature Organization) a Eastgate Systems sú dve organizácie, ktoré spájajú autorov digitálnych diel a majú zásluhu v ich distribúcii.

Už od začiatku rozvoja hypertextových systémov sa táto oblasť úzko spájala s literárnym umením. Najvýraznejší znak tohto spájania vyplýva už z názvu publikácie od autora Theodor Nelson, *Literárne stroje (Literary machines)*. Autor v tejto práci predstavil známy projekt Xanadu, ktorý sa považuje za predchodcu všetkých hypertextových systémov a počítače označil ako nástroje na písanie literatúry.

Najdôležitejšie definície používané v teórii grafov a v informačných technológiách, týkajúce sa hypertextu, sú definície uzla, hrany, grafu, cesty a hypergrafu. Z nich priamo vyplýva grafická reprezentácia hypertextového systému. Teória Espena Aarsetha o kybertexte je všeobecne uznávaná a používaná a aj táto práca využíva jeho prístup. Raine Koskimaa vo svojej práci *DIGITAL LITERATURE – From Text to Hypertext and Beyond* navrhol základné rozdelenie digitálnej literatúry na digitalizáciu tlačnej literatúry, digitálne publikácie originálnej literatúry (prostriedok, ktorý sa používa na jej čítanie sa volá e-book), literatúra využívajúca nové tehniky (samostatne aplikácie, ktoré potrebujú špecifický prehliadač na spustenie), internetová literatúra (diela prístupné na internete spustiteľné v bežnom internetovom prehliadači) a nakoniec špeciálny typ digitálnych textov, ktoré v skutočnosti nemôžu byť považované za literatúru, ale do istej miery zahŕňajú literárne aspekty.

Základné časti každého hypertextového systému sú báza dát, vyhľadávací mechanizmus a užívateľské rozhranie. Oblasť hypertextových systémov sa stále zdokonaľuje napríklad aj vďaka zapájaniu techník vyvinutých v umelej inteligencii. Najznámejšími hypertextovými prostriedkami používanými pri písaní elektronickej

literatúry sú napríklad HyperCard a Storyspace. Ďalšie známe nástroje sú Guide, FrameMaker, Knowledge Pro, SmartText, ToolBook, Storyspace a Inform 7.

Najčastejšie spôsoby využitia hypertextových techník sú interpretácia, navigácia, konfigurácia a písanie textu. Dôležitá je vizuálna reprezentácia, ktorá je najčastejšie reprezentovanou koncepčnou a priestorovou mapou. Hypertext umožňuje ovplyvniť začiatok čítania, manipulovať s časom čítania, vkladať podmienky do textu, viacnásobné čítanie častí textu alebo ovplyvniť ukončenie textu.

Projekt Gutenberg vznikol v snahe sprístupniť v digitálnej forme čo najväčšiemu publiku diela, ktoré boli pôvodne vydané v papierovej forme.

Medzi digitálne literárne diela prístupné na internete patria napríklad *These Waves of Girls* od Caitlin Fisherovej, *Lies* od Richard Pryll, *Incarnation* od Carolyn Guertin, *Daddy Liked His With Heart* od Jennifer Leyovej.

Medzi diela vytvorené hypertextovým systémom ako samostatné aplikácie patria napríklad *Afternoon. A Story.* a *Twilight. A Symphony.* od Michael Joycea, V*ictory Garden* a *Reagan Library* od Stuarta Moultropa, *Patchwork girl* od Shelley Jacksonovej, *Califia* od M. D. Coverleyovej, *Pale Fire* od Vladimira Nabokova, *Hopscotch* od Julia Cortazara a *Ubik* od Philipa K. Dicka.

K iným formám umenia, v ktorých je hypertext nepochybne prínosom sú napríklad počítačové dobrodružné hry, ktoré sa nepochybne zaraďujú do performačné alebo akčné umenie, a písanie kritiky umenia.

Napriek tomu, že prvé hypermediálne fikcie boli vytvorené v čase, keď vznikali aj počítačové hry, ktoré sa tešia stále väčšiemu záujmu, počet digitálnych literárnych diel je stále nízky. Dôvodom prečo ľudia pri odpočinku málokedy siahnu po elektronickej forme knihy sa zaoberá aj Mark Bernstein vo svojej práci *Where the Hypertexts Are*.

Z pohľadu hypertextovej literatúry do budúcnosti je dôležité, aby sa vyvíjali nové a stále lepšie prostriedky, ktoré budú môcť byť používané pri jej písaní. Ale aj samotní autori diel môžu vylepšovať svoje diela hlavne užívateľské techniky. Najlepším spôsobom na zistenie nedostatkov diel je neustále robiť prieskum záujmu čitateľov.

Na záver je priložený zoznam literatúry použitej pri písaní práce.

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