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## KNOWLEDGE THROUGH HYPERMEDIAL APPLICATIONS. A SEMIOTIC APPROACH TO NEW MEDIA<sup>1</sup>

The issue of cognition in hypermedia has appeared to be a key-point of the communicative effectiveness of hypermedial applications since the beginnings of hypertext spreading out. Several scholars have been pointing out that the possibility of easily and quickly accessing to a lot of information and materials in hypermedial applications and on the WWW does not automatically bring the user to easier and deeper knowledge acquisition. In this paper we will add evidence of this by analyzing from a semiotic-hermeneutic standpoint elements of hypertextual transpositions, a particular kind of hypermedial applications devoted to the presentation of classic literary texts. We will thus explain key-factors originating the gap between potential and acquired knowledge and illustrate the capacity of a semiotic-hermeneutic perspective applied to new media.

*Keywords:* semiotics, hypermedia, literature, cognition, images, reading strategies.

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<sup>1</sup> This paper develops the results of a Ph.D. thesis concluded at our Faculty in 2003 on the topic of new media semiotics (Mazzali-Lurati 2003).

## Introduction

In the line of several studies devoted to the issue of cognition in hypermedia (Conklin 1987, Rouet et al. 1996, Ipsen 2003), in this paper we claim that, despite of the availability of a wide and rich range of multimedial materials, the acquisition of knowledge through hypermedial applications happens neither easily nor automatically. It needs to be sustained by appropriate design choices.

In the following we will show how problems of interpretation that users encounter during the navigation can be detected and described by a semi-otic-hermeneutic perspective, thus providing hints to designers.

We will apply this perspective to hypertextual transpositions, i.e., online and offline hypermedial presentations of classic literary texts consisting of the electronic version of the literary text and of a series of multimedial materials that help users in reading and understanding the literary text. After having illustrated our approach (section 1) and clarified how the issue of cognition emerges in hypertextual transpositions (section 2), in the third and fourth sections we will describe from a semiotic-hermeneutic perspective some concrete examples of user's problems of interpretation.<sup>2</sup>

## Semiotic-communicative framework

In our semiotic-communicative framework a hypermedial application is an artefact composed of signs by means of which the author/designer intends to communicate the application contents to users. In this perspective, all the devices composing the application (contents, organizations of contents, hyperlinks, navigational paths, tools, etc.) are signs. Design choices (choices about devices to include in the application) are choices about signs to be used for the communication. They are the "instrument" by which the author/designer can try to control the communication with the user in order to guarantee its success. Success happens when signs are appropriate. Signs are appropriate as far as they help users in gaining a complete and coherent knowledge of the application contents.

In order to judge if the signs fulfil this requirement, we will move from a hermeneutic-interpretative standpoint focussing on the main questions "how do users interpret them?" and "which contribution and

<sup>2</sup> Abbreviations will be used to identify the hypertextual transpositions from which the examples are drawn. Extended references are provided in the reference section.

which difficulties do they bring with as to the comprehension of the application contents?" We will use semiotic concepts and categories that define the semiotic structure of the signs composing the application (which signifier or representamen stands for which meaning) and the type of sign they are (we will mainly refer to C.S. Peirce's classification of signs). On this base, by inference, we identify the process of interpretation these signs require.

This framework shares some fundamental assumptions with other semiotic approaches to new media, particularly with Andersen's computer semiotics (1990, 2001) and De Souza's Semiotic Engineering (2005). Designers have precise intentions and they make given design choices in order to let users recognize those intentions. Devices chosen by designers become signs in respect to their intentions.

However, in our view, not only the signs constituting the interface (as it mainly is in Semiotic Engineering) but also contents and their organizations are signs requiring the user's interpretation and by means of which the designer tries to communicate with users. As a consequence also contents and their organizations can be source of user's cognitive difficulties that it is useful to describe.

#### Application contents and knowledge: the case of hypertextual transpositions

Because of the quantity and the richness of available added materials (that are usually far higher than in printed editions, i.e., the artefact we are accustomed to use for reading classic literary texts), hypertextual transpositions are good examples of hypermedial applications in which the problem of cognition emerges.

It has often been maintained that the richness and variety of contents in hypertextual transpositions brings to a deeper and more complete comprehension of the significance of the literary text (Landow 2006: 278). To a certain extent, this is true. First, the understanding of the literary text can be sustained by the presence of a remarkable amount of images (used for the illustration of all the different aspects of the narrated story). Thanks to these images the reader/user can see the object (the *denotatum*)<sup>3</sup> s/he has to refer in order to understand a given word or passage of the lit-

<sup>3</sup> We refer here to the model of the sign as a semiotic triangle composed by the signifier (the perceptible part of the sign), the *denotatum* (the concrete object of the external reality to which the sign refers) and the meaning (the mental concept or idea which the sign represents in the mind of the interpreter).

erary text. In this way the literary text becomes more directly experiential to her/him. Second, devices, by means of which the author/designer represents given reading strategies to be used in consuming the application contents (organizations of contents, hyperlinks, navigational paths, tools), are present and help the user in avoiding confusion.

However, a gap easily arises between the potential deep and complete knowledge brought by information-intensive hypertextual transpositions and the knowledge the user actually gains. Both the use of images for the illustration of different aspects of the literary text and the presence of reading strategies representations can entail problems of interpretation that hamper the comprehension of the literary text significance.

In the next section we will move from Peirce's classification of signs and the description of the characteristics of analogical signs to understand possible problems of interpretation related to images. Then, in section 4, we will highlight how the choice between different representations of reading strategies (deriving from the choice of given devices to be included in the application) can bring benefits or problems to users.

### The interpretation of images

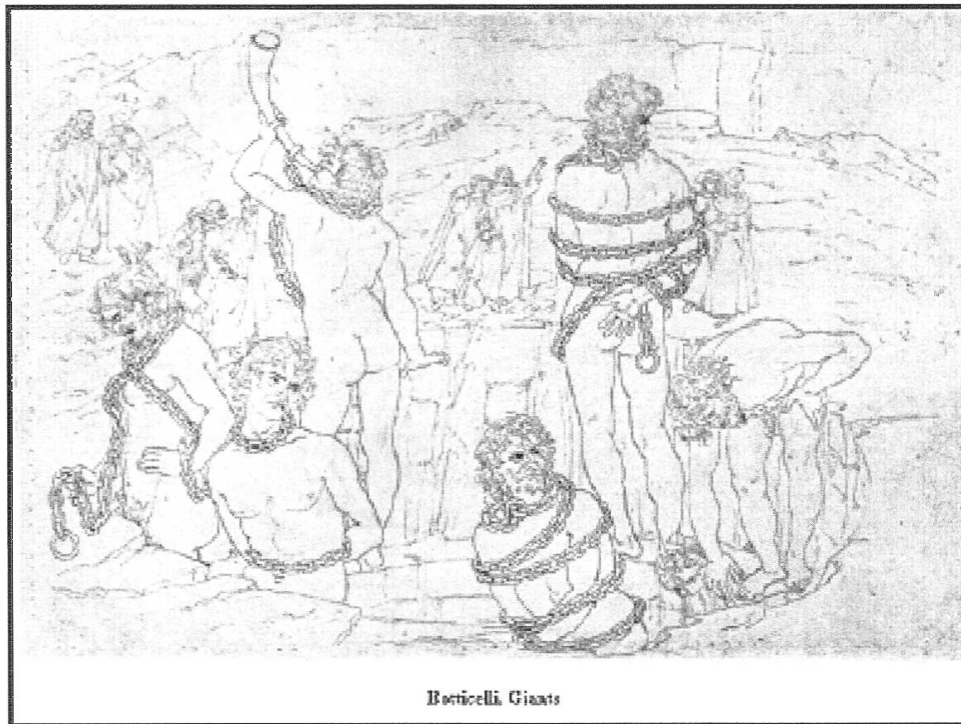
In hypertextual transpositions images are used in order to illustrate the different aspects of the literary text (plot, characters and places), by providing a visual representation of what the literary text represents verbally. This visual representation appears more "natural" and more directly experiential in respect to the text, since it allows users to visually perceive what otherwise they should imagine. At first sight, it seems that its understanding would not require interpretation (cf. Wiley 2003; Wysocki 2003).

In facts, the understanding of the function of images in respect to the literary text is less "natural" than it appears and can entail problems of interpretation. The user can fall in misinterpretations preventing her/him from benefiting of the presence of the images themselves.

In order to adequately illustrate the literary text, images have to fulfil the basic requirement of correspondence (cf. Renner 2001). The content of the image has to correspond to the content of the passage of the literary text to which the image refers. In semiotic terms, the image has to show the *denotatum* of the signs of the literary text to which it refers.

Such a correspondence can be based on an iconic or an indexical relationship between images and text. Stemming from Peirce's definition of

iconic signs<sup>4</sup> we consider that an image holds an iconic relationship to the text, when the user gains a deeper knowledge of the literary text by recognizing the similarity existing between what s/he reads and what the image shows (fig. 1).<sup>5</sup>



*Fig. 1: DC1 – At Inferno XXXI, 33 (“sappi che non sono torri, ma giganti, / e son nel pozzo interno da la ripa / da l’umbilico in giuso tutti quanti”) a Botticelli’s illustration represents the giants in the pit and Dante and Virgil approaching them. Thanks to the similarity the reader perceives between the image and the content of the verses to which the image is linked, the reader’s understanding of the narrated scene is sustained.*

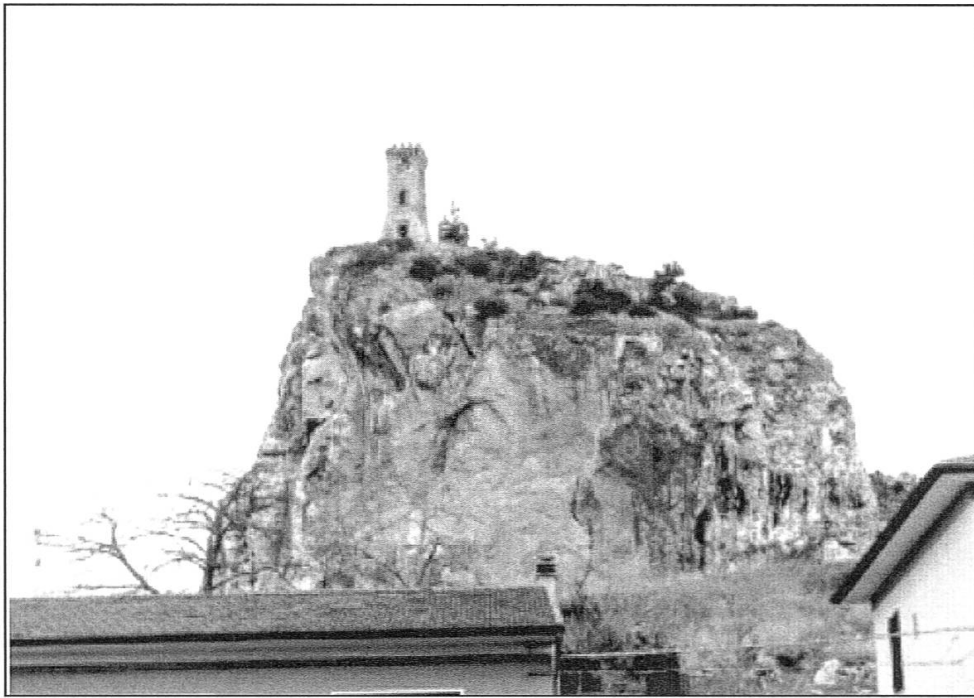
Starting from Peirce’s definition of index,<sup>6</sup> we consider that an image holds an indexical relationship to the text, when the user gains a deeper knowledge of the literary text by recognizing the deictic function of the

<sup>4</sup> An icon is a sign that holds a relationship of similarity to its *denotatum* (Peirce 1931-1958, 2.247).

<sup>5</sup> All the examples of this section are drawn from DC1, an online hypertextual transposition of the *Divine Comedy* in which images completely substitute the “traditional” verbal literary annotations.

<sup>6</sup> An index indicates something (Peirce 1931-58, 2.285) that is “necessarily existent” (Peirce 1931-58, 2.310) and connected to its object as “a matter of fact” (Peirce 1931-58, 4.447).

image that indicates the *denotatum* of the part of the text to which it refers (fig. 2).



*Fig. 2: DC1 – This photograph of the ruins of the fortress of Caprona available at Inferno XXI, 95 (“così ved’io già temer li fanti / ch’uscivan patteggiati di Caprona, / veggendo sé tra nemici cotanti”) enhances the reader’s knowledge of the literary text significance by pointing out the place mentioned in Dante’s text.*

Images fulfil their functions only if users recognize the text-image iconic and indexical relationship. Factors hampering this can intervene and weaken the cognitive benefit brought by the presence of the image. In the following we provide an example.

As analogical signs, images have a high semantic richness (Nichols 1981: 47). A single image transmits at the same time a lot of information in a dense way. In an image not only a given object is illustrated; also colour and spatial perspective are present, which transmit further information. As a consequence, the perception and the interpretation are open to different possibilities (Gombrich 1982: 143-144, 147-148). In an image different meanings can be perceived. Some of them are central and other secondary in respect to the text to which they refer. Problems of interpretation can arise for the user when perceivable secondary meanings stop before or go beyond the meaning of the (passage of the) literary text that the image illustrates.

For instance, the function of indication of the photographs of Monteriggione's towers available in DC1 at *Inferno XXXI*, 40 ("però che, come su la cerchia tonda / Montereccion di torri si corona, / così la proda che 'l pozzo circonda") immediately strikes the user (fig. 3), both because they show the place mentioned in Dante's text and because photographs in themselves have a strong indexical character (cf. Peirce 1931, 2.281; Mazzali-Lurati & Cantoni 2006). By recognizing this function of indication, the user acquires "factual" information about Monteriggione's towers (what they are, where they are, the fact that they still exist, etc.) However, in respect to *Inferno XXXI*, 40, the function of indication is secondary. The main content of this passage of the *Inferno* is the simile between the appearance of the giants emerging from the pit (encountered by Dante at the end of his way through the Malebolge) and the appearance of the towers emerging on the walls of the fortified town of Monteriggione. The purpose of these photographs is to sustain the user's understanding of this simile. In this perspective, the main meaning of the images is not the "factual" information, but one particular feature of the towers: their dimensions and shape and their similarity to the giants. The factual knowledge is helpful in orienting the user toward the grasping of the significance of this passage of Dante's text, but it is not enough in order to fully understand it. However, because of its evidence, this secondary meaning can capture the reader's attention and mislead her/him by hampering the perception of the central meaning and preventing her/him to complete the recognition of the function of indication with the recognition of the iconic relationship existing between the images and Dante's text.

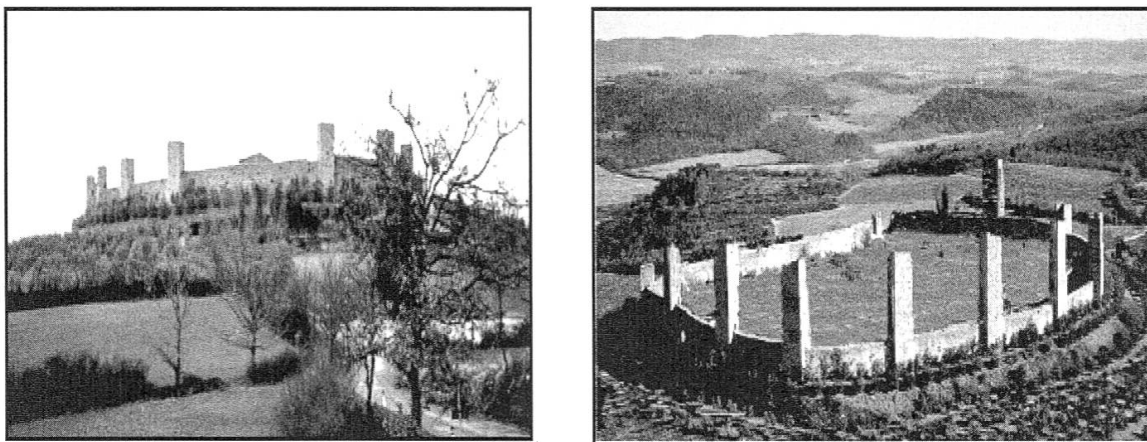


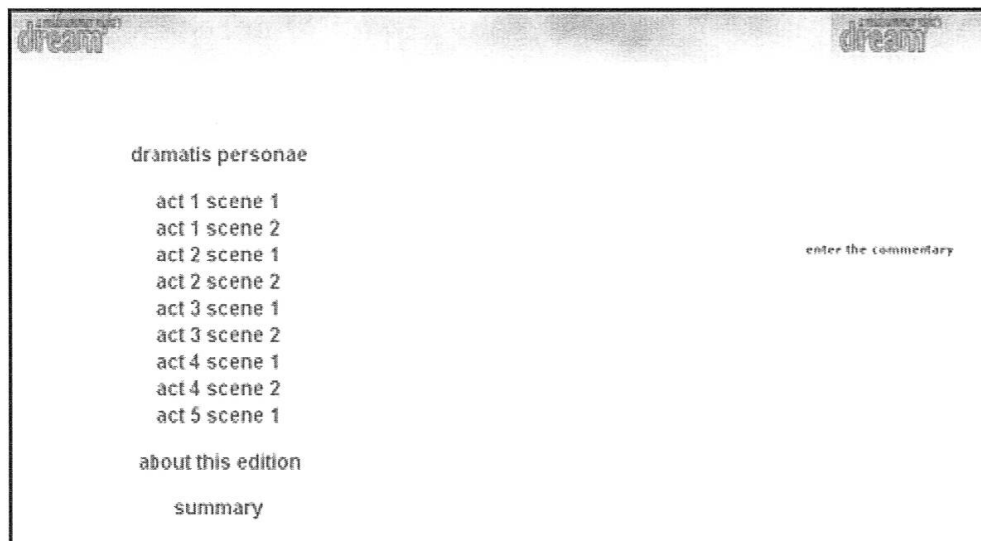
Fig. 3: DC1 – Photographs of Monteriggione's towers available at *Inferno XXXI*, 40.



By determining if an image accomplishes its function by holding an indexical or an iconic relationship to the text and by taking into consideration the central and secondary meanings of the image, authors/designers can gain hints for an appropriate choice of the images to include in the application and, eventually, hints for an adequate use of captions in order to direct the user's perception and supplement user's prior knowledge.

### Problems related to reading strategies representations

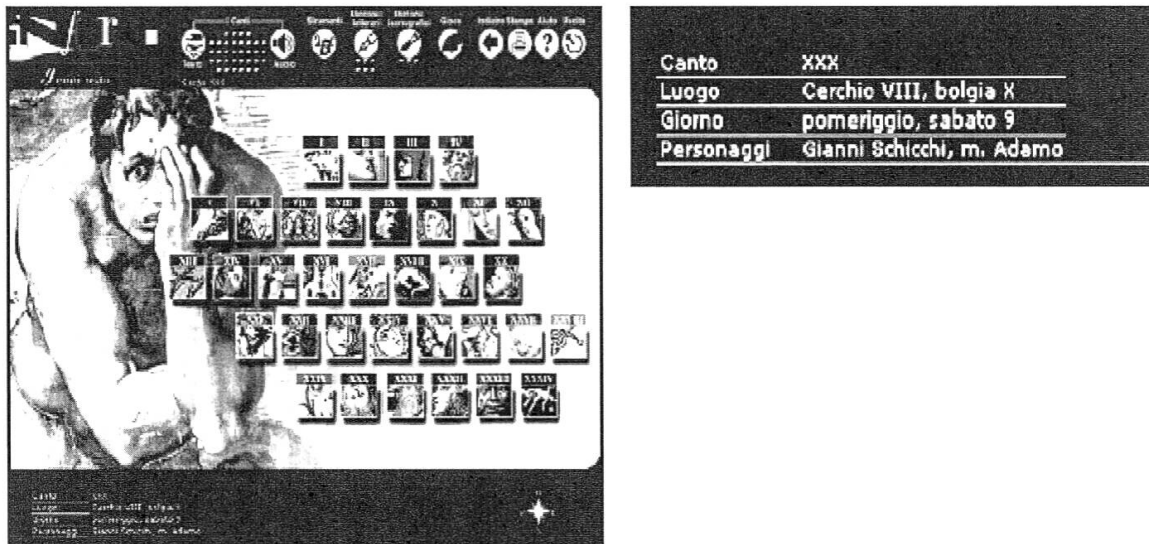
We employ "reading strategy" as a generic term in order to indicate the reader's way to approach the text, to perform the act of reading.<sup>7</sup> For instance, we usually read a novel or a play by "directly accessing to the text", i.e., by tackling the first lines of the text without *a priori* looking for contextual information on the narrated events (where and when they take place, who are the involved characters). The fact that we acquire this information little by little and step by step is part of the pleasure of reading (fig. 4).



*Fig. 4: MD – On this page providing access to Shakespeare's A Midsummer Night's Dream no contextual information on the events narrated in the different parts of the text is provided. Only the possibility of directly accessing to the text is offered.*

<sup>7</sup> Cf. Argenton & Messina 2000 for a complete overview on the topic of reading strategies in literary texts. The issue of reading strategies in hypermedia has been mainly dealt with in empirical studies (cf., for instance, Rouet et al. 1996).

An “opposite” reading strategy is possible, consisting in “accessing to the text in already knowing essential contextual elements of the narrated events”. In order to gain a first important orientation on the story, when starting the reading of certain literary works (in hypermedia, but also in some school editions), we refer to some introductive text providing contextual information about the narrated events (fig. 5).



*Fig. 5: DC3 – By simply rolling over the small image manifesting the link allowing the user to access to the text of each canto of Dante’s Inferno, information about place and time of the events narrated in the correspondent canto is displayed at the bottom of the screen. In this way, when entering the text of a given canto, the reader already got essential contextual information.*

By means of their design choices, designers suggest to users given ways to approach the application contents, given reading strategies. In this view, the devices chosen by designers become signs representing these reading strategies.

The reading of contents happens differently according to the reading strategies represented in the application. For this reason, the reading strategies representation (deriving from given design choices) plays a central role in sustaining or hampering the user’s process of knowledge acquisition. It can bring benefits or problems depending on its adequacy to the main goal the user has to reach and to the main task the user has to accomplish.<sup>8</sup>

<sup>8</sup> Our concepts of goal and task have similarities with the concept of user scenario of user-centered web design and web usability (cf. Badre 2002), but are more restricted.

The main goal of a hypertextual transposition user is the literary text's comprehension. Such a comprehension can be reached in different ways, owing to the major task the user has (or wants) to accomplish. It is possible that the user has or wants to read the literary text, to study the literary text or to conduct some specific research on the literary text. The reading strategies representation is adequate when it supports the user in performing her/his major task in order to reach her/his main goal.

For instance, when “reading the literary text” is the major task, strategies by means of which the reader focuses on the literary text or gets immersed in the reading experience are important and have to be widely and clearly represented. Reading strategies by means of which the user focuses on the literary text are represented in DC2 and M, while they are not represented in DC4 and LM. In DC2 design choices highlighting the option “access to the text of Dante’s *Comedy*” have been made (fig. 6). First, on the homepage the device providing a filtered access to the text occupies the top central part of the screen and almost half of it. Second, on the navigation bar available on the added materials pages, the link “Comedy” is proposed as first possible choice (this link is the first one on the left).

The figure consists of four panels showing different parts of the Princeton Dante Project website interface.

- Top-left panel:** The homepage of the Princeton Dante Project. It features a search bar, navigation tabs for 'COMEDIA', 'MINOR WORKS', and 'MULTIMEDIA', and a grid of links for various resources like 'Commentary', 'Lectures', and 'Multimedia'.
- Top-right panel:** A detailed view of the navigation bar for the *Commedia*. It shows a dropdown menu for 'COMEDIA' with 'Comedia' selected. Below it, there are dropdowns for 'Canto' (set to 'Canto I') and 'Start at Line' (set to '1'). There is also a 'Number of lines' dropdown (set to '15') and a language selection area with radio buttons for 'Italian', 'English', and 'Both'.
- Bottom-left panel:** A page of an added material, specifically a biography of Dante Alighieri. It includes a portrait of Dante and a detailed text block starting with 'Dante Alighieri was born in Florence in 1265 (probably in the latter part of May), in the quarter of San Marco at Palazzo...'. The text discusses his family, his education, and his political involvement in Florence.
- Bottom-right panel:** A detail of the navigation bar for the biography page. It shows three tabs: 'COMEDIA', 'MINOR WORKS', and 'MULTIMEDIA'. The 'COMEDIA' tab is highlighted, and the text below it reads: 'Dante Alighieri was born in Florence in 1265 (probably in the latter part of May), in the quarter of San Marco at Palazzo...'. This text is partially obscured by the navigation bar.

Fig. 6: DC2 – Homepage and detail of the device for the filtered access to the text of the *Comedy*; example of a page of an added material and detail of its navigation bar.

On the contrary, on the homepage of DC4 the access to the text is not brought to the reader's attention. Different links providing access to different contents (among which Dante's text) are proposed. Since all the available choices look the same (their anchor has the same layout), it can easily happen that the user begins exploring all the available contents without or before reading Dante's text (fig. 7).

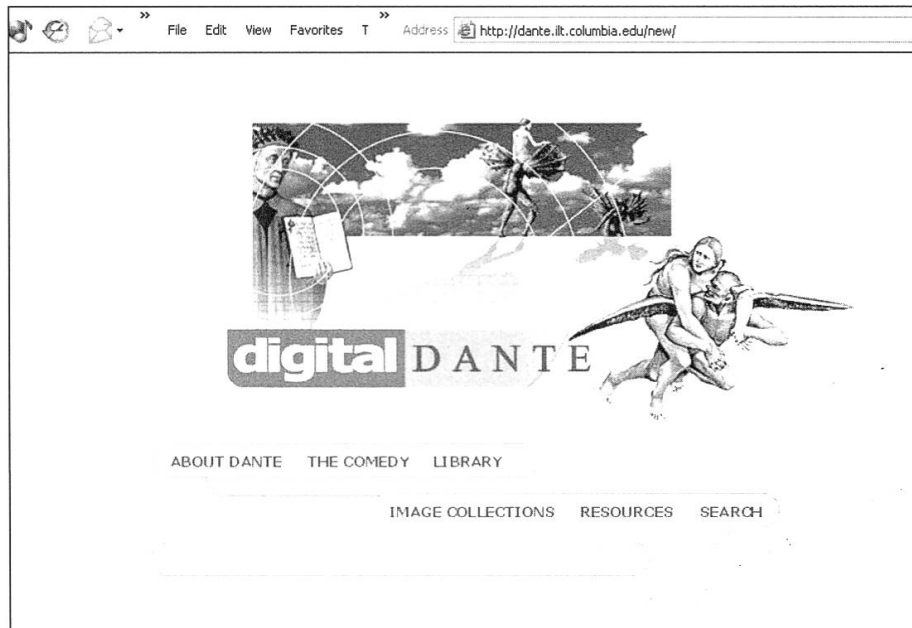


Fig. 7: DC4 – Homepage.

M includes other examples of design choices representing a reading strategy by means of which the user pays primary attention to the literary text. On the page of the available added materials only one striking link is proposed: the “Return” to the text link.

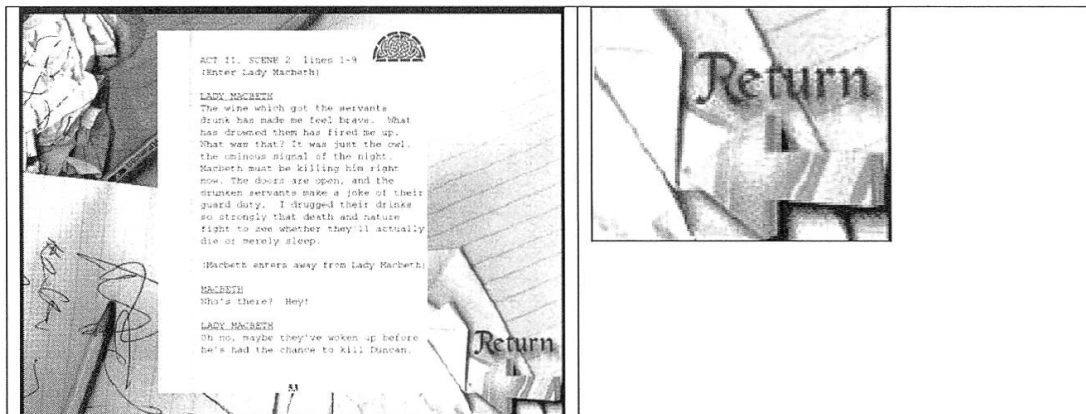


Fig. 8: M – A page of added materials and detail of the “Return” link.

On the contrary, on the pages of the annotations in LM no link allowing the user to go back to the literary text is available (fig. 9). The reader is not invited to focus on the literary text, but to explore thematic paths that can bring her/him far away from the literary text itself.

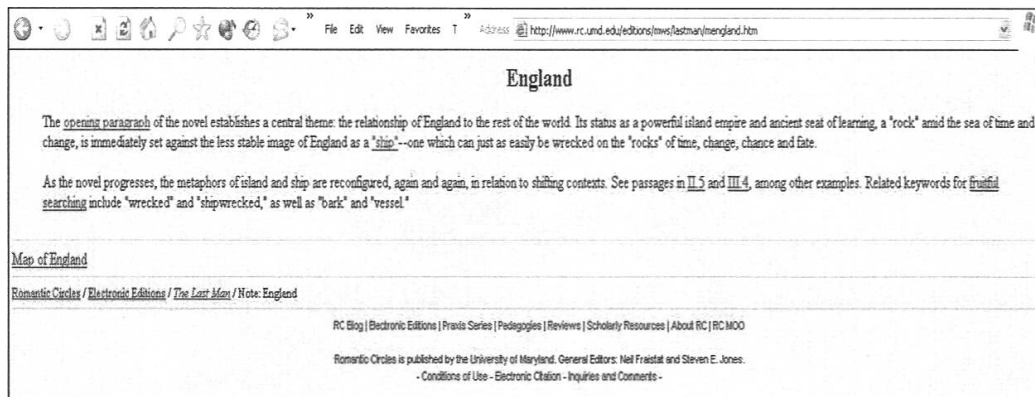


Fig. 9: LM – A page of an annotation.

By being aware of the “power” their design choices have in representing given reading strategies and, thus, in sustaining or hampering the user, designers can gain hints for evaluating the suitability of their choices in respect to the user’s main goal and to the user’s main task. These hints can be structured and organized by defining design patterns (Garzotto et al. 1999) providing re-usable solutions for coping with problems arising in relationship to the representation of reading strategies (cf. Mazzali-Lurati 2003 for the description of design patterns related to hypertextual transpositions).

## Conclusions

As the few above illustrated examples show (thanks to the application of a semiotic-hermeneutic perspective on hypermedia), the possibility to access to a wide range of multimedial materials brings to a wider and deeper comprehension of the application contents, only if the user makes a big interpretive effort. First, the comprehension of the function of images can be a complex process that hinders obstacles preventing users to grasp the most relevant relationship of the images to the text (cf. also Wiley 2003, Wysocki 2003). Second, the understanding of the application contents is strictly related to the represented reading strategies and to their adequacy to the user’s main goal and task.

Authors/designers can take this into account in order to make design choices capable of sustaining this user's hard interpretative work. In this perspective, captions guiding the understanding of the indexical or iconic text-image relationship and coherent and clear representations of reading strategies (for instance based on design patterns) allowing the user to recognize regularities all over the application can play an important role. In this paper our argumentation is based on examples drawn from hypertextual transpositions, a particular (and, in fact, not widespread) kind of hypermedial applications. However, as we already began to prove (cf. Mazzali-Lurati & Schulz 2003), other kinds of information-intensive applications present similar characteristics. Our framework seems to be suitable and helpful also for the description of other more widespread hypermedial applications aiming at transferring knowledge.

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### Analyzed hypertextual transpositions

- DC1) The World of Dante. – <<http://www.iath.virginia.edu/dante/>>
- DC2) Princeton Dante Project. – <<http://etcweb.princeton.edu/dante/index.html>>.
- DC3) La Divina Commedia: [Inferno]: un viaggio interattivo alla scoperta del capolavoro dantesco. – Milano: Rizzoli New Media, cop. 2001.
- DC4) ILTweb Digital Dante. –<<http://dante.ilt.columbia.edu/>>.
- LM) The Last Man by Mary Wollstonecraft Shelley. A Hypertext Edition by Steven E. Jones. – <<http://www.rc.umd.edu/editions/mws/lastman/index.html>>.
- M) William Shakespeare's Macbeth – Bride Digital Classic. Bride Media International, cop. 1999.
- MD) Midsummer Night's Dream – Lingo.uib, Universitetet i Bergen. – <<http://cmc.uib.no/dream/index.html>>.