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Forming the Text, Performing the Work - Aspects of Media, Navigation, and Linking[1]

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This article proposes a theoretical framework intended to facilitate descriptions and discussions of texts of works in different media. The main theoretical traditions which have inspired this endeavor are, on the one hand, textual criticism (with scholars such as Fredson Bowers, D. C. Greetham, Jerome J. McGann, D. F. McKenzie, Peter L. Shillingsburg, and G. Thomas Tanselle), and, on the other hand, hypertext theory (represented by theorists like Espen Aarseth, Jay David Bolter, Jane Yellowlees Douglas, Michael Joyce, George P. Landow, and Janet H. Murray). The study aims to combine and develop the perspectives of such theoretical traditions in order to suggest a more consistent and extensive set of concepts for the analysis of how narratives are stored and disseminated. The study examines the structural aspects of texts and works, and deals with storage, presentation and reproduction of works. Moreover, the structure of works and texts, as well as the navigation related to these structures, are discussed. The study also includes an in-depth discussion on links and linking, and a new terminology is suggested for the subject. The most important concepts discussed are work, text, version, variant, storage medium, storage sign, presentation medium, presentation sign, storage capacity, life expectancy, direct text access, indirect text access, copy, edition, impression, issue, monosequential, multisequential, content space *and* axial structure*. Furthermore, the concepts of* network structure *and* lateral structure *as well as* hypertext, ergodicity, link *and* linking *are examined.*

Contents

Stories are told in various media. We may read them in newspapers, books and magazines, watch them on television and at the movies, listen to them on the radio, on our car stereo or Walkman, or experience them on a computer screen. For a long time, storage media such as parchment, papyrus, paper and the like were, besides the human mind, the only media for storage of fictional and non-fictional texts. Since the late nineteenth century, though, new technologies have made it possible to store not only alphanumeric signs and illustrations but also sound and moving images. The most recent of these new media is the computer, with-tremendous technical advantages in its ability to imitate and incorporate other, older media. Nowadays, the computer may, among other things, be used for reading a novel, watching a movie or listening to music.[2] This is roughly what is known as media convergence. Yet the computer does not only store and present texts of works from other media. Computer games, digital hyperfictions, and web pages are examples of works specific to digital media. In other words, they cannot be presented in any media but the computer.

In general, works are intended to appear in a specific medium; they are, for instance, created to reach the audience stored on printed sheets of paper between covers, on a CD-ROM, or in a newspaper. However, the intended medium is far from always the only medium that can store and present texts of a work, versions of it, or works deriving from it. It might seem easy to tell the difference between, for example, a text in a printed book and the same text stored as a computer file on a floppy disc. But when thinking about it, one might find it difficult to describe the differences

theoretically. If you hear your neighbor reading aloud from *Great Expectations* on the other side of the wall, it would not be possible to tell whether she is reading from the pages of a book or from a computer screen.[3] Yet, later when she is standing at your door step explaining that she happened to spill coffee on her floppy disc, and therefore wants to borrow your copy of Dickens' novel to read the last chapter, some of the practical differences will show. "Anyway," she says before closing the door, "I'm glad I didn't spill it on my floppy disc with *Patchwork Girl* or any other digital hypernovel!"

In order to describe texts of works in different media as accurately and precisely as possible, several aspects must be considered. Characterizing something based on the medium it is stored and/or presented in gives certain information about, for instance, how long the text could be expected to be legible and what equipment that is required for the text to be accessible to the user. Ordinary floppy discs and cassettes, for example, generally have shorter lifetimes than a bound book. To access texts stored in books no special device is needed, while texts stored on floppy discs require a computer, and texts stored on cassettes, a tape recorder.

However, most media may store different types of texts. Two examples of texts that can be stored on floppy discs are mentioned above. Another example is the printed book in which texts of various kinds may be found. Compare, for instance, a novel like *Le Rouge et le noir* with a traditional picture book for children or an academic dissertation. These are three genres different in content and style, but they are also structurally dissimilar. First, the texts do not consist of the same textual material; the novel contains, for example, no pictures. Second, the mode of navigation, that is, how the reader is expected to make her way through the text, varies since the textual material is ordered and organized differently. When reading the novel, the reader is expected to start on the first line of the first page and then continue straight on to the last word of the last page. However, in the academic dissertation, there are footnotes to consider, and at each small footnote number, the reader has to decide whether to jump to the footnote at the bottom of the page.

The aim of this study is to propose a theoretical framework for the description of texts of works in different media. Clearly, the medium storing and presenting a text does provide certain information, but it is even more important to examine the character and structure of texts. A text stored on a hard drive may have more in common with a text stored in a book than with other texts stored on a hard drive. What are the differences between the Sherlock Holmes short story "The Dancing Men" presented on a computer screen, on the pages of a printed book, and on printouts? In what ways does the short story "The Dancing Men" differ from the film adaptation *Adventures of Sherlock Holmes: The Dancing Men* or the cassette version of the short story? How can the interactive DVD video *Sherlock Holmes: Consulting Detective* be characterized and described? What terminology is required to describe these different works, texts, versions as well as the different media used to store and display them? Questions of this kind constitute the point of departure for the present article, whose aim is to offer a theoretical framework for the analysis of certain aspects of the structure of works and texts in different media.

Works are experienced through texts; works are performed as texts. To perform a work, then, is to form a text, to decide what the text will consist of, how the text will be stored and presented and how it will be structured and navigated. In other words, to perform a work is to form a text and to form a text is to perform a work. Besides being performed by the originator, some works require the performance of the user as well. This is the case with, for example, computer games and digital hypernovels in which the work cannot be experienced unless the user performs it by making choices. This consists in making choices that are carried out by clicking with the mouse or pressing the keys. It should be noted that, in this study, the term *user* designates the person experiencing a work, i.e. the reader, the listener, the player or the viewer.

A natural starting point for the description of these processes is to examine the concepts of *work*, *text*, *version*, and *variant*. In order to explain and describe the characteristics of the works that are the subject for this study, other types of works such as paintings, sculptures and buildings are discussed to some extent in the first section of the present article. Thereafter follows a section on the storage and presentation of texts in which the terms *storage medium*, *storage sign*, *presentation medium*, *presentation sign*, *storage capacity*, *life expectancy, direct text access*, and *indirect text access* are discussed. The next section concerns the reproduction of texts offering explanations of the notions of *copy*, *edition*, *impression* and *issue*. In the sections to follow, structures and modes of navigation, that is, how the reader is expected to navigate in different structures, are dealt with in several steps. The concepts *monosequential* and *multisequential*, as well as *content space* are of central importance to the discussion. Three types of multisequential structures, namely *axial structure*, *network structure* and *lateral structure* are discussed, as well as the concepts of *hypertext* and *ergodicity*. An in-depth discussion on *links* and *linking* in which a new terminology for the subject is suggested concludes the study.

The main aim of this article is to present a set of concepts facilitating descriptions and discussions of works and texts from a structural point of view. It is important to stress that the structural aspects of texts and works are discussed and described primarily from a user perspective. Furthermore, it is worth noting that the study mainly belongs to the theoretical traditions of textual criticism and hypertext theory, which has stimulated literary theory. By hypertext theory I here refer to the theoretical discussion on literature and digital media initiated by Jay Bolter, Michael Joyce, George P. Landow and Myron Tuman in the early 1990s, and continued by scholars such as Espen Aarseth, Jane Yellowlees Douglas and Janet H. Murray.[4] The definitions and the use of the concepts mentioned above must be considered in light of these fundamental standpoints. This is particularly crucial since the majority of the concepts, their relation as well as other issues in the discussion, would be described and handled differently (to a greater or lesser degree) if approached from another angle or discipline such as library and information science, archival studies, computer science or law studies. I am acutely aware that something that from a user perspective seems to be a simple point-blank procedure,

often is a much more complex and complicated process on a deeper, more technical level. On the surface level, that is the user level, a link is just a link, a connection between two places. However, below the surface in the technical sea, a link is far more complicated than that, and could not be described simply as a connection between two places.

In the following, examples are given in order to illustrate and explain the concepts and phenomena that are being discussed. Thus the examples' primary function is to illustrate the theoretical discussion and to offer a concrete complement to the theoretical descriptions. Accordingly, I have chosen fairly common examples to which many people can relate. Naturally, these in turn constitute a selection, since the aim of the study is not to provide an exhaustive inventory of examples, nor a discussion of intricate cases. For instance, there are web browsers that work differently from the ones that I describe, as well as there are other storage media than the ones I discuss. In addition, it should be emphasized that due to rapid technological development, especially in the digital field, the examples are to be considered more or less historical. What I describe as a trait characteristic of an ordinary web page or a computer game may be replaced by something else tomorrow. As a result, the theoretical framework presented is not to be thought of as fixed and complete, but as moldable and expandable.

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1. The Concepts of Work and Text

In textual criticism the concept of *work* usually signifies an abstract artistic entity, whereas *text* is the term used to denote the representation of that entity, through which the work has to be experienced.[5] My understanding of the concepts of work and text is within this tradition. However, I have adopted a broad definition of the concepts of work and text, deriving from a semiotic perspective. As I see it, all man-made products are systems of signs. All these sign systems can be considered as texts, presenting works. The work as such can never be accessed but through some kind of text, that is, through the specific sign system designated to manifest a particular work. The sign system may consist of alphanumeric characters, spoken language, music, still pictures or moving pictures, to mention only a few examples. Text (and sign system) is not to be understood as the physical manifestation as such, but as the abstract representation of a work, that in turn is presented in for example ink on paper.

The text could be said to function similarly to a lens, since it inevitably has an influence on the experience of a work. For instance, a poor edition of *Jane Eyre* studded with misprints distorts the reader's view of the work while a textually correct edition offers a clearer view. The task of textual critics is traditionally to see to it that the text displays the work as accurately as possible, or, figuratively speaking, to clear the lens from scratches and dirt. If the broad semiotic understanding of the concepts of work and text is applied to man-made products in general, the principles of textual criticism could be considered applicable to anything intentionally produced by man. Thus, although textual criticism traditionally concerns literary works, the same principles may be applied to all kinds of works, such as maps, paintings, films, cartoons, buildings and sculptures.

In *A Rationale of Textual Criticism*, G. Thomas Tanselle writes that "[a]ll works of art have texts, whether usually called by that name or not, for they all consist of arrangements of elements; and all can be the objects of emendation, for those elements (or their arrangements) can always be altered, producing different textures."[6] This is to say that equally to works of literature and music, works of sculpture, painting and ceramics have texts. However, in the latter case, the texts *are* the works, whereas, in the former case, the texts *are not* the works. A sculpture, a vase, a painting and a building are tangible, material works in which text and work coincide – a broken vase is a broken work and a broken text. This is to be compared with intangible, immaterial works like a novel, a song or a poem, where neither the work nor the text can be physically torn to pieces or demolished. Because of the nature of text and work of tangible works, and their interrelationship, they could, in theory, be referred to as either-works or texts without one excluding the other. Here work and text are considered as physically inseparable and they both implicitly include the other. Therefore, I would say, the fact that Tanselle in his later writings rarely speaks of tangible works in terms of work and text does not forcibly imply a change of point of view.[7]

According to Donald McKenzie, the object of bibliography and textual criticism should not just be the traditional book and the text it stores, but also "non-book texts." "Scholars," he writes, whether their particular field is books, maps, prints, oral traditions, theater, films, television, or computer-stored databases, "note certain common concerns" as they all deal with records that "have a textual function which is subject to bibliographical control, interpretation, and historical analysis."[8] It is important to remember, however, that McKenzie mainly discusses immaterial, intangible works, and narratives in particular.

As I see it, although they deal with different kinds of works, the restorer and the textual scholar share a common concern in that they both seek to clean the lens, to obtain a text that accurately presents the work. To restore a sun-bleached painting with a rip in the canvas and a broken frame means to carefully mend the canvas, repair the frame and brighten up the colors. Erasing the traces of the years that passed, the restorer tries to restore the work of painting to a former or original state. Similarly, the textual critic seeks to present a text of a literary work as accurately as possible. Often, but far from always, this is a text that corresponds to the text that the author intended to create and disseminate.[9]

In contrast to the restorer, the textual critic generally has to consider a number of texts deriving from the author's manuscript and to decide which of these to recover and edit. For example, some tend to choose the author's manuscript

as copy-text while others are inclined to use the first printed, or published, version as copy-text.[10] Another rather complicated issue concerns changes to manuscripts made by the publisher, and to what extent these should be considered and accounted for. As a result, methods for establishing text vary largely from case to case depending on the choice of copy-text, the preconditions regarding document access and quality etc. A manuscript may, for example, be available in its entirety or in fragments and in excellent or poor condition. But, there may just as well be no remains of the original manuscript or no copies of the first edition, leaving the textual scholar with copies of later editions and other material such as letters, diaries and notes.[11] All kinds of alphanumeric texts, irrespective of genre and artistic quality, have been treated this way.

An example illustrating the wide-ranging principles of textual criticism is Charles Dickens' drawing room at 48 Doughty Street, London. As far as it can be determined, the room has been reconstructed to the state in which it was in the fall of 1839 when Dickens had just completed *Nicholas Nickleby*. Various documents describing the room (letters, diaries, paintings etc.), in combination with microscopic examinations of the walls and comparison to later homes of the writer, made it possible to reconstruct the room to a state allowing the visitors to the museum to experience the room as it was at the time when the young Dickens was living there. The work, Dickens' Drawing Room at 48, Doughty Street, appears through the text that is the reconstructed room. However, whereas the person concerned with the "reconstruction" of the text of *Nicholas Nickleby* is called a textual critic and deals with alphanumeric characters and illustrations, the person reconstructing the room is called a curator and works with a sign system consisting of furniture, wallpaper, carpets, curtains etc.[12]

In theory, anything is to be considered a work regardless of which qualitative, aesthetic or other judgments that are attributed to it. But, traditionally, only works of original character are thought of as works. Consequently, to be considered a work, a product must have what is called "verkshöjd" (literally "work height") in Swedish. This implies that it must have a certain originality and independence in relation to other products.[13] Of course, there are no absolute standards for measurement to rely on – there is no practical list of criteria forming a basis for the judgment of the would-be work. Even though this is not really a problem in the everyday use of the concept of work, the issue is indeed crucial in matters of copyright law in which a work's status is of considerable consequence. In order for something to be legally considered a work it has to fulfill certain requirements concerning originality. It is important to note that in terms of copyright law, originality does not apply to the ideas as such, but to the way in which they are presented and formulated.[14] The legal definition of the concept of work is obviously narrower than the one used in, for instance, textual criticism (and consequently in this study).

Henceforth, independently of this broad definition of the concept, *work*, as pointed out, denotes the abstract entity, whereas *text* is the term used to designate the abstract representation of that entity, the sign structure through which the work must be experienced. It should be stressed that the text is not physically more concrete than the work. A text can be corrupted, but not stolen or burned since what is stolen or burned is only the physical signs (i.e. ink, printing ink, magnetic particles) manifesting the text as well as the medium in which these physical signs are stored and presented (cf. storage signs/presentation signs and storage medium/presentation medium below). Thus, the text is not the word 'text' in print ink on this page, but the abstract constellation of the linguistic signs *t*, *e*, *x* and *t*. This is why different copies may carry the same text whereas the sets of physical signs storing it are as many as the number of copies.

In its final report on the functional requirements for bibliographical records, the IFLA (International Federation of Library Associations and Institutions) presents a definition of the concept of work that explicitly includes aspects of both definitions presented above:

> [W]ork: *a distinct intellectual or artistic creation.*
> *A* work *is an abstract entity; there is no single material object one can point to as the* work*. We recognize the* work *through individual realizations or* expressions *of the* work*, but the* work *itself exists only in the commonality of content between and among the various* expressions *of the* work*. When we speak of Homer's* Iliad *as a* work*, our point of reference is not a particular recitation or text of the* work*, but the intellectual creation that lies behind all the various* expressions *of the* work.[15]

Previously I argued that the principles of textual criticism could be applied to all kinds of works. This implies that the sign systems (in the semiotic sense of the concept) representing these works, the texts, can in principle consist of anything. Tanselle's definition of *text* as "arrangements of elements" is extensive and covers other, more specified and limited uses of the term in which elements are to be of a certain kind and/or arranged in a certain way.[16] In its broadest sense however, *text* could be understood as signifying elements in any form arranged in any way. Accordingly, a painting as well as a building, a garden, a manuscript or a vase may be considered texts. Also, these are not only individual texts, consisting of arrangements of elements (sign systems), but they could just as well, and at the same time, constitute elements of another text. They could all for instance be part of the text Charles Dickens' home. In other words, depending on the perspective, the element can be a single letter, a phrase, a novel or a library.[17]

Adopting this wide definition of text makes it clear that it is possible to distinguish between various kinds of texts depending on the character of the elements of which they consist, e.g. what kind of signs that constitute the sign system. The following analysis concerns mainly texts consisting of alphanumeric characters, sound, and images. Elements of these modes of expression, as they may be called, are combined in different constellations, which we label film, fiction, picture book, computer game, cassette book, hyperfiction, and so forth. Thus the study mainly covers texts

that are alphanumeric, cinematic, audible and/or pictorial.

Textual scholars distinguish between different forms of works. Distinctions are frequently made between, for instance, verbal works and visual works, works of literature and works of painting and between works that have a physical form and those that do not.[18] Tanselle, for example, differentiates between on the one hand *sequential* arts using intangible media (such as language, musical sounds, and dance movements) and in which "the products have duration – with dimensions in time rather than in space"; and on the other hand *stationary* arts using solid, tangible media (such as clay, paint and rock).[19] Sequential works are thus temporal, not spatial; stationary works are directly accessible whereas sequential works always have extension in time.

But restricting the definition of stationary works to works that use tangible media entails some difficulties, especially when it comes to digitally stored text. With today's digital environment and technology, it is more obvious than ever that spatiality is not necessarily equal to permanency and physicality, characteristics associated with, for instance, paintings, photos, statues and ceramics. It might just as well imply transiency and virtuality as for digital pictures displayed on a computer screen or projected on a wall.

Furthermore, a division of works in, on the one hand temporal (sequential) works, and on the other hand, spatial (stationary) works is somewhat deceptive. There are no clear-cut forms of works. Intended or not, all works have, in fact, both temporal and spatial properties of some kind. For instance, a temporal work such as a picture book for children consists of spatial elements (the individual illustrations). The same goes for comic strips as well as for novels with illustrations, like *Robinson Crusoe*. But even literary works realized exclusively with typographic signs may have spatial properties. Pattern poetry such as Apollinaire's poem "La Cravate et la montre" (*Calligrammes*) is one example.

Spatial works also have temporal properties (irrespective of the originator's intentions) in the sense that they change over time; statues crumble, paintings bleach and buildings are provided with new roofs. Therefore, it seems more convenient to distinguish between mainly temporal works and mainly spatial works. This distinction can be made regardless of the medium (in Tanselle's sense of the word) of the work.[20] As to digitally stored texts, this means that the characteristics of what the user actually experiences (and not the actual technical structures of the work) decide whether the work will be described as mainly temporal or mainly spatial.

It is essential to notice that several works may coexist in one and the same artifact. Together, these works form a whole, but they may also be considered individually. In an anthology, for example, several mainly temporal works are put together. The reader may either choose to contemplate a single work, for instance, a poem or a short story, or consider them all in relation to one another. Mainly spatial works may also appear under similar conditions. For instance, the paintings and sculptures of an art exhibition may either be experienced as individual items or as elements in the work – the exhibition – i.e. the selection, organization and display of a number of works of art.

The famous Silver Bible on display at Carolina Rediviva, the Uppsala University Library, may serve as another example. A theologian would probably primarily regard the Silver Bible as a manifestation of the work *The Bible*, while an art historian would most certainly focus on the ornaments of the covers. Like the art historian, the book historian would take interest in the ornaments, but also in the material of the cover, the quality of the paper, the ink, the binding, the type and the layout and so forth. Thus the theologian would pay attention to the mainly temporal, immaterial work whereas the art scholar and the book historian would find the mainly spatial, material work of greater interest. The same person may of course shift rapidly between these perspectives, and the overall impression of the Silver Bible is most likely to be a coalescence of both. After all, if one of the works was removed, the Silver Bible would no longer be the Silver Bible. Naturally, this does not only apply to the magnificence of the Silver Bible; any 'book' could, in fact, be described as consisting of a mainly spatial as well as a mainly temporal work.

Several textual critics have stressed the importance of this issue, rejecting the idea of the book or any other medium as merely a container and its contents as something that, without being affected, could be moved from one container to another.[21] Anything, from extraordinary covers, as in the case of the Silver Bible, to the way in which the typographic signs are distributed over the pages, might have textual and aesthetic implications and therefore needs to be taken into consideration. Jerome McGann argues that in order to fully understand a work, it is necessary to examine both the linguistic and the bibliographical codes (typography, paper etc.). As a consequence, both aspects should be incorporated in critical editing:

> *Every literary work that descends to us operates through the deployment of a double helix of perceptual codes: the linguistic codes, on one hand, and the bibliographical codes on the other. . . .*
>
> *Textual and editorial theory has heretofore concerned itself almost exclusively with the linguistic codes. The time has come, however, when we have to take greater theoretical account of the other coding network which operates at the documentary and bibliographical level of literary works.*[22]

Sharing this view, Donald McKenzie points to John Kidd's research on *Ulysses* as an example of the importance of awareness and analysis of the bibliographical code. Kidd has shown how James Joyce's fascination for numbers permeates both the linguistic and the bibliographical codes and how there is an intricate interplay between them. For example, Bloom reads a letter from his daughter who turned fifteen on the fifteenth of June. What is more, in Joyce's proofs the letter is fifteen sentences long. A stunning example of Joyce's bibliographical awareness is that the 1922

edition of *Ulysses* falls on precisely 366 leaves and 732 pages. As it happens, the story of Ulysses takes place in the year of 1904, which, as several times pointed out, is a leap year. A leap year has 366 days and 366 nights, 732 days and nights in all.[23]

Closely associated with the distinction based on the predominance of temporal or spatial properties of a work is the division between works intended to be reproduced in multiple copies and works intended to be disseminated in only one original.[24] This is particularly apparent in Tanselle's distinction between sequential and stationary works since he strongly emphasizes that the former can be made manifold, and that the latter is chained to a unique physical object. In fact, Tanselle's distinction could be said to be based on these qualities of a work instead of on temporal or spatial properties.[25]

The category of works intended to be made manifold embraces, for example, novels, poems, films, video games, cartoons, and pop songs. The other category, works intended to be disseminated in only one original, includes, for instance, sculptures and paintings. Often, this distinction runs parallel with the one regarding temporal and spatial properties of a work, as indicated in the examples given above. Personal letters and diaries are examples of mainly temporal works that are meant to exist in one original only.[26]

However, several forms of works, such as drama, opera and ballet, fall in both categories or, if one prefers, in-between them. Take for example August Strindberg's *A Dream Play* [*Ett drömspel*], which is intended to be read as well as performed on a stage with actors and props. Thus the printed text must be considered as intended for the readers as well as for the performers. This printed text, with stage directions and other instructions as to the performance, may be reproduced in multiple copies just like a novel.[27] At the same time, several productions of the play are made which differ from one another in various ways. In addition, each production consists of a number of separate performances that in turn are more or less dissimilar and, per definition, unique since they happen in real time. Hence, the printed text of the play that Strindberg wrote provides instructions for the performances of the work of drama known as *A Dream Play*. Productions, as well as each performance, of *A Dream Play* are based on these instructions. In fact, both the production and each single performance could be regarded as works represented through texts.

The existence of a work of drama lies in the performance of it. By this follows, as stressed by Tanselle, that a play may not have existed as a work but in the form of plans in the playwright's mind and, to a greater or lesser degree, in written text.[28] Sometimes works of this kind are also transformed into other kinds of works. Or, it might be more correct to say that they are *treated* as other kinds of works. For instance, when reading and discussing *A Dream Play* in class, the work of drama has been somewhat transformed into a work of closet drama, functioning similarly to a novel.

But one could argue that closet dramas, novels, cartoons and films must also be "performed" since they must be processed by the human mind (read, watched, listened to, contemplated, etc.) to come into existence as works. In analogy, every single one of these performances is unique since each person experiences a work differently (not only in relation to other people but also from time to time).[29] The same goes for all works: every person in the audience applauding a performance of *A Dream Play* leaves the theater having processed/performed individual, and thus unique, mind performances. The real issue is whether the text causing this mind performance is one of a kind or not – the performance of *A Dream Play* is one of a kind, whereas the text of *Great Expectations* is manifested by signs printed on pages between covers on innumerable bookshelves around the world.

The novel *Robinson Crusoe* is a mainly temporal work intended to be reproduced in multiple copies. As long as the copies are identical in that they offer the same sequence of alphanumeric signs, in other words, the same text, they all represent the novel *Robinson Crusoe*. This is true regardless of whether it was published in 1945 or in 2000. However, the concept "identical" is somewhat relative since minor textual variants in spelling, punctuation and the like are accepted. If, for instance, the printing-press is stopped during the printing process in order to correct a misprint, some of the copies of that edition will contain the misprint whereas others will not. Another example of a *variant* is when the spelling has been modernized – the text with the ancient spelling and the text with the modern spelling both represent the same work.[30] Usually, textual scholars distinguish between accidental and substantive variants. Accidental variants are dissimilarities in spelling, word-division, italics, punctuation and the like that do not affect the meaning. Substantial variants, on the other hand, are variations that do change the meaning. A typical example of a substantial variant is when there is a difference in the choice of words or in the word order.[31]

However, there may be "copies" of a work where certain parts of the story have been changed or even left out. This is common when dealing with adaptations of a work to a new audience, like *Robinson Crusoe* for children or in a Swedish translation. In revisions of this kind, the copies no longer represent the work, that is the novel *Robinson Crusoe*, but a *version* of it.[32]

Alterations to a work resulting in the birth of a version can be made either by the author or the editor. In the example with *Robinson Crusoe*, alterations producing versions for a young audience and for Swedish readers have been made by the editors. Authors producing versions of their own works are often, to a greater or lesser extent, influenced by an editor, a publisher, a friend or any other person requiring, proposing or encouraging the writer to make changes to the work. Dickens, for example, was persuaded by his colleague Edward Bulwer-Lytton to change the ending of *Great Expectations* from one in which Pip and Estella go separate ways to one in which they walk away hand in hand. In a letter to his friend and literary advisor John Forster, Dickens wrote:

> *You will be surprised to hear that I have changed the end of* Great Expectations *from and after Pip's return to Joe's, and finding his little likeness there. Bulwer, who has been, as I think you know, extraordinarily taken by the book, so strongly urged it upon me, after reading the proofs, and supported his views with such good reasons, that I resolved to make the change. You shall have it when you come back to town. I have put in as pretty a little piece of writing as I could, and I have no doubt the story will be more acceptable through the alteration.*[33]

There is thus a version of *Great Expectations* with an unhappy ending (the original manuscript version) and a version with a happy ending (the revised version that was printed in *All the Year Round*), and they were both produced by the originator of the work.[34]

In order for a revised work to obtain the status of a version, the differences must be considerable:

> *When an author revises a work so radically that he can be said to have produced a work which creates a changed aesthetic effect, the result should be thought of as a different version. . . . On the other hand, a revision which does not constitute a different version is one which corrects, modifies, or extends a text without substantially changing its essential character.*[35]

Although James Thorpe, in the quotation above, explicitly discusses only authorial versions, the same principles are usually applied when distinguishing between what could be called editorial versions.

When thoroughly rewriting his or her creation, the author may create a new work instead of just a new version. Because at a certain point, when the changes have radically modified the work, it is no longer correct to label it a version. Instead, it has to be considered as a new, independent work. Of course, it is impossible to establish rules defining exactly how modified and/or different something has to be in order to no longer be thought of as a version, but as a new work.[36] What one scholar regards as a version, another may consider a new work. Similar problems also occur on the border between variants within the original work and a new version of it. How many changes are allowed to be made within the range of one work?[37] In both cases, the two alternatives can be pictured as the two hanging pans on a balance. In one of the pans, the scholar places for instance everything that supports a description of the studied object as a version whereas in the other, she places everything that supports a description of it as a new work. Sometimes one of the hanging pans is clearly heavier than the other; at other times it is very hard to tell the difference between the two since the amounts – the "indicators" – in the two hanging pans are almost equal. In the end, the result depends on the scholar, given that she is selecting, evaluating and placing the "indicators" in one of the two pans.

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2. Storage Medium, Presentation Medium and Text Access

Texts of works are, generally speaking, stored in some sort of media.[38] Common *storage media* for texts (in the broad sense of the word) are books, cassettes, CD-ROMs, floppy discs, DVDs, videocassettes, hard drives, etc.[39] Examples of storage media not frequently used in our time are rock, papyrus, parchment and bone. Thus, here the term storage medium refers to the material on which a text is "recorded" (no matter which elements constitute the text) or, to be more precise, to the material that carries the signs representing the text, i.e. the *storage signs*.[40] The storage signs for a printed text may for example be alphanumerical signs in ink, print ink, paint or crayon on paper. But the same text may just as well be stored as Braille signs, magnetic impulses on a magnetic tape or as pits and flat areas on an optical disc. A set of storage signs on a storage medium may be erased (e.g. when formatting a floppy disc or erasing lead from a sheet of paper) or replaced by another set of signs representing another text (e.g. when re-recording a video tape or when saving changes to a Word document). Storage media may exist independently of storage signs – a clean sheet of paper, an empty floppy disc, tape or CD – while storage signs cannot possibly exist outside some kind of a storage medium.

Evidently, all forms of storage media cannot store all kinds of text. This is because many storage media use storage signs that can only store certain types of texts. A book, for instance, uses storage signs that could not possibly store sound, and a canvas uses signs that are unable to store animated films. Furthermore, a distinction can be made between analog and digital storage signs. In the example above, both the book and the canvas are storage media using analog storage signs. An ordinary cassette tape and a videotape also use analog storage signs since the magnetic imprints on the tape constitute a direct representation of the text and the signal recorded corresponds to the signal originally heard by the microphone or seen by the camera.[41] In other words, a beat on a big drum results in the groove on a gramophone record taking a big swing.[42]

Magnetic storage signs are not always analog, but may just as well be digital. Floppy discs, DAT-tapes and hard drives store text as magnetic imprints. However, unlike the cassette tape and the videotape, the imprints represent binary code that in turn represents the text. The original visual or audible signal is sampled and converted to a specific number reflecting the intensity of the signal. It is the binary form of this number that the magnetic imprints on the tape represent (analog-to-digital conversion). When the tape is played, the original signal is reconstructed from these numbers (digital-to-analog conversion).[43]

Storage media using digital storage signs (digital storage media) are generally magnetic or optical. Floppy discs, DAT-tapes, zip drives and hard drives are examples of magnetic digital storage media. Common optical digital storage media are CDs and CD-ROMs. The ability to store various texts consisting of typographic signs, sound, and moving as well as still images is characteristic of digital storage media.

Storage media do not just differ in what they can store but also in how much they can store and for how long they can store it. The *storage capacity* of a storage medium varies, both in relation to other forms of storage media and to storage media of the same kind.[44] An illustrative example of the variation in capacity between different storage media is the Swedish encyclopedia *Nationalencyklopedin*. In print, it requires twenty-four volumes of an average of 500 pages per volume. The multimedia edition of the work is stored on six CD-ROMs. Each disc contains *all* the articles of the print edition as well as all the search functions, while pictures and additional multimedia features such as birdsong and short video clips are distributed among the discs. Stored on DVD, one single disc holds the entire multimedia edition.[45] In reality, then, one disc stores the same text (alphanumerical characters and pictures) as twenty-four books and, in addition, sound, moving images and search functions.

Historically, the storage capacity of computer hard drives has increased remarkably. The first hard disk was introduced in 1956 and was provided with fifty 24-inch aluminum disks. The total storage capacity of this hard drive, the Model 305 Disk Storage unit, was five megabytes, i.e. five million characters.[46] Today, less than fifty years later, the hard drive of an ordinary personal computer might have a storage capacity of forty gigabytes, that is forty thousand megabytes.

Preserving texts for a period of time is the task of every storage medium. In archival science, storage media are discussed in terms of *life expectancy* (LE), a concept used to "clarify different expectations about the ultimate survival" of documents carrying information "by describing the anticipated longevity of the various media on which they are recorded. Life expectancy is determined both by the chemical and physical properties of the medium and by how it has been housed and handled."[47] So the life expectancy of a storage medium concerns the ability to preserve storage signs in such condition that they can fulfill the task of representing texts. LE values vary and may be longer or shorter. Sand, for instance, has an extremely short LE (a message written on the beach will often be erased within a couple of minutes) while certain kinds of rock have a very long LE (for example, cave paintings dating from the Aurignacian period c. 28,000 – c. 22,000 BC have been found in Dordogne in France.) Naturally, it is difficult to determine the exact LE value of a certain storage medium, and LE values are therefore generally very approximate. Or, as one researcher puts it, LE values for storage media are similar to miles per gallon ratings for automobiles – the actual mileage may vary.[48]

Material type and quality of both storage medium and storage signs have a strongly significant influence on the LE value. Granite or limestone, lead or ink, acid-free paper guaranteed for 350 years, or recycled cheap paper – the choice is decisive. In fact, paper has a LE value of between 6 months and 500 years depending on the quality and the conditions under which it is stored.[49] Likewise, the LE of magnetic tapes and optical discs vary because of the use of different component material. The storage signs of a magnetic tape consist of magnetic particles; one could say that the magnetic particles constitute the ink of the magnetic tape. It is crucial that these particles remain magnetic – if the magnetism is lost the storage signs are erased and the text becomes irretrievable. As it is, certain types of magnetic particles are able to retain their magnetic properties longer than others.[50] One example of differences in LE value as to optical discs are "green" CD-Rs (recordable CDs) that are considered to have a shorter LE than "gold" CD-Rs.[51]

With an expected lifetime of 500 years, microfilm has by far the longest LE among the analog audiovisual storage media.[52] This is the same LE value as for high-quality paper. However, it is important to remember that, with paper, we know for sure that it can last for 500 years, while we still have to wait another 450 years before we can tell whether a 500-year-old microfilm can still be read.

The material of the storage medium is one reason why many analog audiovisual media have relatively short LE. Comparing a printed, high quality book with an audio book of *Winnie the Pooh* there is little doubt which one of them that is likely to be enjoyed by more than one or two generations. Although used to the same extent, the storage signs in the book will presumably still be intact serving their purpose when the cassette tape will no longer function, i.e. when the storage signs have altered or disappeared due to loss of magnetism. The covers may be stained, the spine mended with tape and the pages yellowed, but the text will still be the same as long as the storage signs do not fade and as long as all the pictures and pages are left. The cassette tape is, to put it simply, made of plastic, which generally is more vulnerable to time than paper is. The book may suffer rather severe damage without the storage signs being affected, whereas the cassette tape has to be in good condition for the storage signs to be accessible. Furthermore, as already mentioned, the degradation process of the tape's storage signs is comparatively fast, i.e. the loss of magnetism in magnetic particles is generally faster than the fading of ink.[53]

Digital storage media storing text as magnetic imprints (floppy discs, DAT-tapes, hard drives and the like) change and age similarly to a traditional cassette tape. Optical discs, on the other hand, function differently. The binary code that is stored as magnetic impulses in magnetic storage media is represented by pits and flat areas called lands on optical discs.[54] The technique used for producing these pits and lands varies from one type of disc to another. With molded discs, like CD-ROMs, the pits are actual hollows in the polycarbonate (the plastic).[55] Similarly to magnetic audiovisual storage media, optical discs suffer from being made of plastic. Moreover, it should be noted that a given sequence of bits (hence called "bit stream") might be stored differently in different storage media depending, among other things, on the

physical properties of the storage medium.[56]

Clearly, material type and quality have a great influence on life expectancy. But to obtain maximum longevity, it is also of considerable importance that storage media are preserved and handled properly.[57] The conditions under which a storage medium and consequently also the storage signs are stored may largely expedite, or impede, the aging process. Inscriptions on church floor gravestones, for example, are often fully readable, provided that they have not been constantly exposed to the feet of the members of the congregation. Storage signs of gravestones having been frequently marched upon vanish whereas they remain intact on gravestones situated in less frequently visited areas of the church floor. In the same way, my personal copy of *Madame Bovary* will most certainly have a longer lifetime than the copy of the same edition at the public library. Exposing a CD to heat and bright sunlight will expedite the degradation process. In fact, a report on the life expectancy of different storage media published by NML (National Media Laboratory) indicates that many of the storage media that are currently used, including paper, have longer LE if kept in a cool (15º C) and relatively dry place.[58]

Another aspect to consider is that some storage media and storage signs may degrade faster if handled and used often. A cassette tape suffers far more than a book from frequent handling. Dust, fingerprints and different kinds of debris have a negative effect on tapes. But even the mere use of the tape, i.e. putting it in the tape recorder and listening to the text it carries, often wears the tape.[59] This can be compared to texts stored in ink on paper, where the storage signs are not exposed to any electro-mechanical device every time the text is read. Thousands of pairs of eyes may read the same sentence without the storage signs being damaged. But if the sentence is written in Braille and read not by a thousand eyes, but by a thousand fingertips, the reading will indeed cause damage to the storage signs. In this respect, optical discs are extremely durable since the laser beam causes no wear to the storage signs.[60]

The aging process happens gradually regardless of whether the life expectancy of the storage medium and the storage signs is estimated to be short or long. Words on a gravestone fading away during a period of hundreds of years is like the message in the sand eroding in extreme slow motion in front of your eyes. The aim of conservators, whether they deal with books, films, paintings, furniture or buildings is to slow down this process as much as possible by means of appropriate preservation conditions and handling. An enormous problem that book conservators are faced with is the destruction of paper due to acidification: "Literally billions of books and documents made during the last century and a half are disintegrating before our eyes." In the early nineteenth century one started to use aluminum sulfate in the manufacturing of paper. This resulted in paper becoming acidic, remaining so even after the manufacturing process. The acid makes the paper brittle and shortens its LE value remarkably.[61]

Naturally, conservators handle storage media in all the stages of the degradation process. Often, their task is not only to preserve storage media, but also to restore them in order to retrieve texts and works. One of the main advantages of analog recording (analog storage signs) is that the deterioration process is usually discernible. This makes it possible to detect degradation of quality and to transcribe the text before it becomes completely unreadable. Digital storage signs on magnetic tapes, on the other hand, show little, if any, quality deterioration. Once the tape fails, the damage is severe since sections of storage signs are irrevocably lost.[62]

But restoration of storage media and storage signs is not always an option. Often, especially with very old documents, the storage medium as such is a valuable cultural artifact, a work that must remain unaffected. The primary effort is then to prevent further deterioration. In many cases, though, it is not only the mainly spatial work (the storage medium) that is of great interest, but also the text of mainly temporal (or mainly spatial) works that it stores. However, retrieving and transcribing texts stored in old and damaged storage media without any negative effects on storage medium and storage signs, may sometimes be very complicated and difficult.

The Vindolanda texts, dating from around AD 92 and onward, have proved a challenge for papyrologists in this respect. The documents from the Roman Army in Britain are of two kinds: ink tablets and stylus tablets. The ink tablets were fairly easily deciphered by the use of infrared photography making the faded ink clearly visible. The stylus tablets, on the other hand, were more damaged since the colored beeswax, in which the text had been recorded by incision with a metal stylus, in most cases had perished. What was left for the papyrologists to work with was therefore a wooden surface covered with scratches caused by the stylus penetrating the wax. Having been reused several times, the tablets did not only contain scratches from the storage signs of one isolated text but from a number of texts. To be able to read and transcribe the texts, engineer scientists and papyrologists are currently collaborating in the development of image processing techniques making it possible to digitally analyze the tablets.[63]

Some storage media do not only store text but they also present it to the user; they are both storage medium and *presentation medium*.[64] Under normal conditions, that is at the time when the Vindolanda texts were still intact, no special devices were needed to read them. Tablets of this kind, along with books, gravestones, paintings, letters and messages written in sand, are examples of storage media that are also presentation media. The introductory phrase of the print version of the short story "The Dancing Men" ("Holmes had been seated for some hours in silence, with his long, thin back curved over a chemical vessel in which he was brewing a particularly malodorous product.") is stored as characters in print ink on a sheet of paper in a book and presented to the reader in exactly the same way.[65]

Just as a distinction can be made between storage media and storage signs, it is possible to distinguish between presentation media and *presentation signs*. The presentation medium of the phrase quoted above, for example, is the

printed page of a book while the presentation signs are the letters in print ink. As to a painting, the presentation medium is the canvas and the presentation signs are the paint with which it is covered. Characteristic of these cases is that the text is stored as it is to appear to the user; the storage signs are also the presentation signs. When the storage medium is the presentation medium and when the storage signs are also the presentation signs, users could be said to have *direct text access*.

However, it is far from always the case that users have direct text access. It is not possible to watch *The Adventure of the Dancing Men* with Jeremy Brett and David Burke simply by looking at the videotape on which the text is stored, nor is it possible to listen to the audio book "The Dancing Men" by holding the cassette tape close to one's ear. The reason is that the storage signs somehow differ from the presentation signs. This may be related to size, as for slides and microfilms, or to more radical differences as for texts stored in binary code appearing to the user in the form of music or video clips. Users can only experience texts stored in a storage medium as a set of magnetic imprints, a pattern of hollows, or in mini-format on a considerably reduced scale if it is presented as moving and still images, sound and alphanumeric characters (of course in a number of constellations). Generally, this cannot be achieved in the storage medium, and a separate presentation medium is therefore required. A television set, a film screen, loudspeakers and a computer display are common examples of presentation media.[66] Here, the term *indirect text access* indicates that the presentation medium and the storage medium are two separate items and that the presentation signs are not the same as the storage signs.

Books are, among other things, practical in that "they can be read by the unassisted naked eye," as Peter Shillingsburg puts it in a discussion on printed and electronic scholarly editions.[67] Of course, this is because the book has direct text access, i.e. the storage medium is also the presentation medium and the presentation signs coincide with the storage signs. For obvious reasons, no technical apparatus is needed to make storage signs appear to the user as presentations signs when the text access is direct. However, when the text access is indirect, an electric, electro-mechanical or digital device (e.g. a tape recorder, a microfilm reader, a projector, a video tape recorder, a CD-player, a Walkman, a computer, or a phonograph) is necessary to perform the text, that is to read the storage signs in the storage medium and present them as presentation signs in the presentation medium.[68] The tape recorder, for example, reads the magnetic imprints of the tape and then presents them as sound in loudspeakers.

Thus one could say that these devices function as interpreters translating storage signs into presentation signs. The translation process as such, however, functions differently depending on the character of the signs. Digital storage signs, for example, need to be converted while the analog storage signs can be projected or played directly. This is because analog storage signs store a direct representation of the text in question. With direct text access the storage signs are analog. But this does not mean that all analog storage signs provide direct text access. Storage signs of magnetic tapes, for example, may be analog and the storage signs of reels, OH-films and slides are analog. In all these cases, the text access is indirect since the storage signs are not intended to function as presentation signs as well. Even though it is possible to watch texts stored on slides in bright light, the Major Oak of the Sherwood Forrest is supposed to appear as a magnificent, verdant tree against a blue sky, not as a brownish miniature.

The process consisting of retrieving bit streams stored in a digital storage medium and from that make words, video clips, film, music etc. appear in a presentation medium, is executed by the sophisticated device known as a computer. The task of interpreting binary code is complicated due to the fact that any specific bit stream, like 00010101 for instance, may, in principle, represent anything: a character, a sound, an image, and so forth. Therefore, in order to gain access to a digitally stored text, not only the appropriate hardware is required but also the appropriate software. The proper computer program, then, is indispensable if digital storage signs are to appear as presentation signs. In an essay on these matters, Jeff Rothenberg stresses the importance of software:

> *In effect, document files are programs, consisting of instructions and data that can be interpreted only by the appropriate software. That is, a document file is not a document in its own right: it merely* describes *a document that comes into existence only when the file is "run" by the program that created it. Without this authoring program – or some equivalent viewing software – the document is held cryptic hostage to its own encoding. . . .*
>
> *The meaning of a file is not inherent in the file itself, any more than the meaning of this sentence is inherent in its characters or words. In order to understand a file, we must know what its content* signifies, *i.e., what meaning it has in the language of its intended reader. Unfortunately, the intended reader of a digital file is a computer program, not a human.*[69]

Even though software other than the original (i.e. the program that created the document) may sometimes be able to read a file, it is only the original software that can ensure that no information is being lost.[70] Therefore, when speaking of the computer as a device for performing texts, I refer to the hardware as well as the software required in order for users to gain access to the text and experience the work.

To sum up, all copies of works can be described as having either direct or indirect text access. Characteristic of copies with direct text access is that the only technical device required to read the text is the physical item functioning both as storage and presentation medium, i.e. the book, the newspaper, the painting etc. As to copies that have indirect text access, on the other hand, no less than three gadgets are needed to experience the work: the storage medium, the proper device, and the presentation medium. The three parts may be clearly detached constituting three isolated items –

videotape, video recorder, TV; reel of film, projector, film screen; gramophone records, phonograph, loudspeakers, etc. Sometimes the device in question and the presentation medium share a common "shell" whereas the storage medium is, more or less, on its own. This is the case with, for example, a cassette tape recorder, a microfilm reader, and an old-fashioned horn phonograph.

The so-called electronic book or e-book (best known is perhaps the Rocket eBook) is an excellent example of a case in which the three are together instead of being separated as described above.[71] In an object the size of an ordinary printed book, the storage medium, the presentation medium, and the device converting storage signs to presentation signs, are thus found. It is no secret that the Rocket eBook, in trying to convince the readers that this is the book's new look, imitates certain characteristics of the printed book such as its size and its portability.[72] From this point of view, one can easily see how there might also be certain commercial interest in simulating direct text access, the mode of the traditional paper book.

Of course, the e-book is nothing but a rather simple computer. The only difference is the name, which implies that this particular computer has more in common with a book than with other computers. The label 'e-book' refers to the entire package including storage medium, presentation medium and the device required to perform the storage signs and present them as presentation signs, in the same way as the machine, known as the computer, generally includes a CPU (Central Processing Unit), a memory (storage medium) and output facilities, i.e. display, loudspeakers etc. (presentation medium).[73] In some cases, it is all included in one practical carrier, like the Rocket eBook, a Pocket PC or a Palm Pilot. In other cases, however, computers require entire rooms with air-conditioning. Naturally, the capacity in terms of performance, processing skills, etc., largely varies between different kinds of computers, which, in turn, has consequences for which texts they are able to store and present. For a number of reasons, it is, for example, possible to play the computer game *Doom* in a Pocket PC but not in a Rocket eBook.

Another interesting aspect of digital storage and presentation media is that they are generally remarkably flexible. Some digital storage media are compatible with several different presentation media, like a DVD, for example, that may either use the display of a computer, a television, or – if the text is only aural – even the loudspeakers of a stereo. Similarly, loudspeakers connected to a computer or a stereo may present music stored on CDs. There are also digital presentation media that may present texts of several types of storage media. The display of a computer, for instance, can show a text stored on the hard drive, on a floppy disc, on a CD-ROM, on a DVD etc. But it is not only exclusively digital storage and presentation media that are flexible; some presentation media have the ability to present texts stored in analog signs as well as texts stored in digital signs. On a television, for example, one may watch movies that are stored on videotapes or on DVDs. Stereo loudspeakers is another example; they may present texts stored on gramophone records, cassette tapes, CDs, etc.

The life expectancy of the physical storage medium is for obvious reasons decisive both for copies with direct text access and those with indirect text access. If the storage medium and the storage signs are too much damaged, the text is lost regardless of whether it is stored on a tape, a CD or in a book. However, there is a major difference in that the condition of storage medium and storage signs is the only aspect to consider when dealing with direct text access, whereas several factors are relevant when dealing with indirect text access. Whether the stored text is undamaged or not is insignificant if there is no apparatus with which to present it to the user. If a microfilm is intact around the year of 2450 it is of little importance if there is no microfilm reader to enlarge and present the text with. As for videotapes, the issue is well known, and in several cases there are only one or two appropriate and functional videotape recorders in the world at specialist laboratories.[74]

A recent example reminding us of the consequences of obsolete formats is Nelson Mandela's last speech before he was sentenced to life imprisonment. The three-hour speech, given in 1964, was recorded on so-called dictabelts, a type of audio recording used between the 1940s and the 1960s. When the recording was rediscovered, one major problem turned out to be the lack of technological devices with which to render the speech – it was even feared that all dictabelt machines had disappeared. However, after great efforts and by means of one of the last remaining machines in the world, the National Sound Archive at the British Library was finally able to retrieve the sound. In 2001, for the first time since 1964, it was thus possible to listen to Mandela's defense speech.[75]

Floppy discs from the early stages of computer technology are more than four times as big as ordinary floppy discs that are used with today's personal computers. Additionally, their storage capacity was largely inferior.[76] But even if an ancient floppy disc would slip smoothly into a contemporary disc drive, this does not mean that the computer would be able to present the text being stored on it. In order for this to be feasible, the storage medium and the storage signs must be undamaged. Moreover, the appropriate device and presentation medium are needed, which means that both hardware and software must be available and functional.[77] Thus deterioration of the storage medium/the presentation medium (including storage signs and presentation signs) is the only threat to texts stored in books and other storage media offering direct text access whereas texts stored in digital media are faced with several dangers: physical decay of storage media, obsolescence of hardware, unavailability of software, and loss of information about format, encoding or compression of files, etc.[78]

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3. Copy, Impression and Edition

Works are represented by texts that are stored as storage signs in storage media. The individual physical manifestations – books, CDs, tapes, etc. that we can buy, forget on the bus or borrow from a friend – are each and every one to be considered a *copy*.[79] Roughly speaking, copies of mainly temporal works intended to be manufactured in large numbers are all reproductions made from a master.[80] From a historical perspective, the master was a printing form used to imprint the text that was to be reproduced on a receiving material such as paper, tissue and metal. In fact, the earliest surviving printed item, a Buddhist charm dating from the eighth century, is believed to have been printed from metal plates and to have been one out of a million copies.[81]

In the history of printed books, printing forms have been made of various materials such as wood, steel, and copper. The oldest method used when inscribing on the printing form a text that was to be multiplied was cutting in relief, which is also the technique used by the movable type. However, letterpress, as this process is called, is not the only form of printing. When using the technique called intaglio, the text, instead of being cut in relief, is incised or carved into the substance constituting the printing form (used for example in engraving). A third printing method is planography, i.e. the manufacturing of copies using diverse photographic, xerographic (as in traditional copying machines) and chemical techniques.[82]

Until the mid-twentieth century, the letterpress method and the procedures invented by Gutenberg in the fifteenth century dominated the printing of books.[83] In this process, the printing form is an assemblage of individual types set by hand or machine, i.e. the typesetting. Keeping much type standing, particularly during the hand press period (1500–1800), was inconvenient and expensive since it required large amounts of type. Due to lack of type, more substantial texts were seldom typeset at one time, but typeset and printed sheet by sheet.[84] In the eighteenth century, printers tried to replicate the standing type in metal plates, but it was not until in the beginning of the nineteenth century that the use of stereotype plates became widely spread among printers.[85]

The result of the introduction of plates in the printing process was that one typesetting could be stored for several years and that it could be reused repeatedly during that period. This lead to a remarkable increase in the number of copies produced from one master since it was no longer unusual that several impressions were made from the same typesetting. An *impression* is all the copies printed from one typesetting at one occasion.[86] Before the introduction of plates, only one single impression was usually produced from an *edition*.[87] Here the term edition is used in the original bibliographical sense of the word and is to be understood as the abstract, theoretical analog to the concrete setting in the form of standing types, plates or other.[88] The edition of a novel printed in the eighteenth century, then, is the arrangement of alphanumeric signs constituting words and sentences whereas the setting, the printing form, is the arrangement of physical types representing these words.

However, in the world of books, the term ‘edition’ is also used as a designation of all the copies made from one edition: "An *edition*, first of all, is all the copies of a book printed at any time (or times) from substantially the same setting of type, and includes all the various impressions, issues, and states which may have derived from that setting. As to the meaning of substantially the same setting of type, there are bound to be ambiguous cases, but we may take it as a simple rule of thumb that there is a new edition when more than half the type has been reset…."[89] To further complicate the matter, the term is also commonly used to designate a specific selection of copies of an edition: leather-bound edition, pocket edition, first edition etc.[90] The current bibliographic term for ‘edition’ in this sense is *issue*, and this is also the term used here for a particular group of copies of an edition.[91] Furthermore, in order to avoid ambiguities, the total of the copies produced from one edition (i.e. a type-setting or a master) will consistently be referred to as ‘copies of an edition’ and not an ‘edition’.

During the last fifty years, setting with type has gradually been replaced by other techniques for setting. Planographic forms of printing, such as offset lithography and photo-offset, more or less ruled out the letterpress, only to, by the end of the twentieth century, face great competition from computer typesetting, so called desktop publishing, and digital printing techniques such as print on demand. Thus the composer no longer works in front of a case with types holding a composing stick, but with a keyboard in front of a display.[92]

Consequently, the printing form serving as the master in the manufacturing of copies is rarely standing types or plates nowadays, but computer files stored in some kind of digital storage medium. In fact, most books that are produced today could be described as sophisticated printouts since they originate from a computer file. However, it should be noted that computer printers use different printing methods; a laser printer, for example, uses planography, while the dot-matrix printer uses relief.[93] The concept of edition is valid also when the storage of the text intended to be reproduced, is digital. Copies are produced from files, which could thus be said to function as typesettings. Furthermore, copies produced from one file at one occasion constitute an impression whereas all the copies of an impression distributed at the same time is an issue.[94]

Again, it should be stressed that the perspective adopted is that of the user. The unity of an edition is here a question of whether the stored files will produce exactly the same sequence of alphanumeric signs or not. The digital instructions (the binary code) for the typesetting as well as the technical processes involved in the production of a single copy may therefore differ. As a matter of fact, they often do but without it being noticeable to the user. In other words, two copies that to the user appear to be two copies of an edition, may, on a more technically sophisticated level, be radically

different.

Desktop publishing and settings being stored as computer files have largely facilitated the reproduction of texts. Corrections and changes can be made without resetting the entire text; modifications in layout (typeface, margins, etc.) as well as major changes to the text itself (such as insertions, deletions and rearrangements) are performed in a few keystrokes. This means that new editions are far more easily accomplished with digital typesetting than with any other method.[95] Moreover, an important difference is that a text stored as a digital file can easily be reproduced and disseminated stored on various storage media. Still, whether the text is stored on a CD, a floppy disc, a hard drive, in a flash memory or in a book, all copies originating from the same typesetting, i.e. the same computer file, are copies of the same edition. This implies that copies do not necessarily need to look the same to be of the same edition; whether thick, rectangular and in paper, or flat, round and in plastic, there is, from the user's point of view, only a difference in storage medium and storage signs, i.e. the edition has been produced in several storage media versions.[96]

An example of an edition reproduced in several storage media versions is Stephen King's bestseller *Bag of Bones* (1998) that can be bought directly from his publisher Simon & Schuster either as a printed book or as an electronic text (similarly to several of his other works). Worth mentioning is also King's novel *The Plant*, which was only published in a digital, downloadable version. Hence, quite opposite to what is generally the case with novels, and particularly those by well-known writers, *The Plant* appears exclusively in a digital version.[97] However, not only writers with primarily commercial objectives are attracted to cyberspace and digital storage media, but also textual scholars. In Sweden, the most extensive project of its kind is the critical edition of the Swedish nineteenth-century literary classic C. J. L. Almqvist's "Collected Works," where the texts are published simultaneously in a book version and a digital Internet version.[98]

Yet maybe the most illustrative example describing editions in multiple storage media versions is the everyday handling of digitally stored texts. Finding an interesting article on the Internet, we may download it and save it on the hard drive (personal computer copy). Finding it uncomfortable to read a fairly long article from a screen, we print it out (paper copy). Then, having been entirely absorbed by the fascinating theories presented by the article's writer, we decide to save the text on a floppy disc as well (floppy disc copy) – just in case the hard drive would crash. In the end, we possess three copies of the same edition, but in different storage media versions.

It is important to stress that copies of an edition are not necessarily textually identical.[99] There may, in fact, be variants within a storage media version such as a misprint in the first impression of a printed text that was corrected in the second, and dissimilarities due to italic and bold letters turning 'normal' by mistake (cf. textual variants). Naturally, similar discrepancies also occur between storage media versions – for instance, there is no reason to transmit errors and mistakes from a printed version to a CD version. But storage media versions may also differ because of more radical changes having been made to the text. Intentionally or by accident, material might have been added, removed or changed. In digital versions, for instance, the text is often furnished with additional links and indexes or in other ways modified to take advantage of what the digital medium has to offer in terms of search functions, navigation tools, etc. Also, the ability of the digital medium to store moving images (video clips, for example) and sounds are frequently exploited. One example previously mentioned is the Swedish encyclopedia *Nationalencyklopedin* that exists in a book version, a CD-ROM version as well as a DVD version, where video clips and sound have been added to the digital versions. If regularly updated, the digital versions may come to differ even more from the print version. Thus different storage media versions of an edition may grow further apart textually if one of the versions is repeatedly updated. As a result, the storage media version soon becomes a new version of the work and eventually even a new work.

The crucial question, then, is how much a text may be modified before the typesetting must be considered altered to the extent of having generated a new edition. Of course, there is, and will be, a difference of opinion over this matter; the digital copies of *Nationalencyklopedin* might be thought of as products of another edition than the printed book or as products of the same edition. Or, it may be more accurate to choose neither of these alternatives, but to distinguish between an (original) edition and an augmented edition since most changes are additions of textual material. In other cases, depending on the way in which the text was altered, it might be more correct to speak in terms of a revised or a reduced edition.

So far, the discussion has principally concerned the reproduction of mainly typographic texts. However, the principles of the manufacturing of copies are also applicable to the reproduction of texts that cannot be stored on paper, such as computer games, music and films. Like typographic texts, these kinds of texts are reproduced from an edition and may be stored in different storage media.[100] The Beatles' *Help!* for instance, that was released on LP in 1965 may probably today be found in as many storage media versions as there are storage media available for storage of audible texts: on audio CD, cassette tape, mini disc, DAT tape, hard drive (in MP3 format or other), etc. There may also, of course, be other differences between these versions than that concerning the storage medium: for example, a remixed version of *Help!* was recently distributed. Similarly, the Oscar-winning film *Shakespeare in Love* exists on reels of film used at movie theaters and on videotape for private use. The film can also be purchased on DVD with additional material such as cut scenes and interviews with the cast.

Even though what one could call the stage-one producers of copies (that is the different agents in the music industry, the film industry, the computer game industry, as well as in the book industry) never cease dreaming of and struggling for complete control over the manufacturing of copies, the reproduction of texts continues even after the stage-one copies

have left the producer. Legal or not, copies are manufactured both on a small scale for individual use and on a more organized and commercial scale where they are retailed (so-called pirate copies). In bibliographical terms, however, regardless of copyright laws, all copies carrying text of the same typesetting (in a broad sense) are produced from the same edition. The reason for this is that the concept of edition is not defined by the identity of the producer of the copies, but by the setting from which a text is reproduced. When photocopying the text in a book, the bunch of papers is, just as the book, to be considered a copy of a new impression of an edition. The two copies are of the same edition but of separate impressions. Consequently, as long as the copying of audio CDs, CD-ROMs, videocassettes, books and texts stored in other storage media continues, the number of copies of editions will keep on growing. On the other hand, "copying" the text by typing it word for word does not create a copy of the same edition (in the bibliographical sense of the words ‘copy’ and ‘edition’), since the typesetting is no longer the same.

In the previous sections I have used the terms work, text, version, variant, storage medium, presentation medium, copy, edition, issue and others. It should be noted, though, that, although using another set of terms, the International Federation of Library Associations and Institutions (IFLA) has dealt with the same problems that I have discussed here. However, these two sets of terms are conceptually different from each other and they are therefore not directly compatible. To illustrate similarities and differences, IFLA’s terms have continuously (mainly in footnotes) been discussed in relation to the terms used in this study.

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Notes

(The URLs were checked in July 2001)

1. This essay is part of my doctoral dissertation *Hyperlitterärt berättande – narrativa strukturer och ergodicitet i ett antal skönlitterära hyperverk* [*Hyperliterary Narration: Narrative Structures and Ergodics in some Hyperworks*] (prel. title) written within the research project "IT, berättandet och det litterära systemet" ("IT, Narrative Fiction, and the Literary System") run by Avdelningen för litteratursociologi (The Section for the Sociology of Literature) at Uppsala University. The research project is funded by Axel och Margaret Ax:son Johnsons stiftelse för allmännyttiga ändamål (The Axel and Margaret Ax:son Johnson Foundation for Public Benefit). Professor Johan Svedjedal is the project leader.

I warmly thank my advisor Professor Johan Svedjedal who helped me at every stage of the thinking and writing process. I also express my gratitude to Mats Dahlström who scrutinized the manuscript and offered me valuable advice. For suggestions and comments on the manuscript I also wish to thank Helena Francke and Mikael Gunnarsson at the Swedish School of Library and Information Studies, and my colleagues in Uppsala, Jenny Björklund, Paula Henrikson and Jon Viklund. I would furthermore like to thank Ursula Wiljanen, who patiently helped me with language consultations, Mats Cullhed and David Westberg for being my support in Latin and for giving me useful comments on my link terminology, Jerker Lantz for being my technical support and for explaining complicated technical procedures and Caroline Persson who edited the manuscript for publication. [Return to the text]

2. Cf. Jay David Bolter’s and Richard Grusin’s concept of ‘remediation’, defined as "the representation of one medium in another," Jay David Bolter & Richard Grusin, *Remediation: Understanding New Media*. Cambridge, Mass. & London: MIT Press, 1999, pp. 44–50, quotation from p. 45. [Return to the text]

3. For purely practical reasons, I refer to the user (the reader, the listener etc.) as ‘she’ throughout the essay. [Return to the text]

4. Cf. Alex Soojung-Kim Pang, Hypertext, the Next Generation: A Review and Research Agenda. *First Monday* no. 11, vol. 3, 1998 (November 2, 1998), URL: http://www.firstmonday.dk/issues/issue3_11/pang/. [Return to the text]

5. Although used this way by most textual scholars, the concepts of ‘work’ and ‘text’ are rarely defined explicitly. An exception is the well-known distinctions of G. Thomas Tanselle, see for example: G. Thomas Tanselle, *A Rationale of Textual Criticism*. Philadelphia: University of Pennsylvania Press, 1989. See also Johan Svedjedal, *The Literary Web. Literature and Publishing in the Age of Digital Production. A Study in the Sociology of Literature*. (Acta Bibliothecae regiae Stockholmiensis ; 62, Skrifter utgivna av Avdelningen för litteratursociologi vid Litteraturvetenskapliga institutionen i Uppsala [Publications from the Section for the Sociology of Literature at the Department of Literature, Uppsala University] ; 42). Stockholm: Kungl. biblioteket, 2000, pp. 50–54. [Return to the text]

6. Tanselle 1989, p. 18 (quotation). Cf. also Tanselle 1989, p. 32 f. [Return to the text]

7. Cf. for example G. Thomas Tanselle, Libraries, Museums, and Reading. *Literature and Artifacts*. Charlottesville: Bibliographical Society of the University of Virginia, 1998, 3–23 [the essay was first published in 1991 in pamphlet form]. [Return to the text]

8. D. F. McKenzie, *Bibliography and the Sociology of Texts*. Cambridge: Cambridge University Press, 1999, p. 39. [Return to the text]

9. For a critique of this parallel between critical editing and restoration, cf. Paul Eggert, Editing Paintings/Conserving Literature: The Nature of the ‘Work’. *Studies in Bibliography* vol. 47, 1994, 65–78. [Return to the text]

10. The most influential essay on the principles governing the choice of copy-text is Walter W. Greg, The Rationale of Copy-Text (orig. publ. 1950–51). In: *Collected Papers*, J. C. Maxwell, ed. Oxford: Clarendon Press, 1966, 374–391. Concerning the choice of copy-text, Edward Vanhoutte distinguishes four main groups determined by the purpose of the edition and the theoretical orientation of the critical editor: 1. editors that are concerned with establishing a single ideal text representing the final authorial intention; 2. editors that are concerned with establishing a single ideal text representing a best text in contrast to a corrupt, incomplete or damaged text; 3. editors that need a single best text for some other reason then in 2.; and 4. editors that do not want to establish one single text but believe that the meaning of text lies in the multiplicity which is to be found in the history of text, Edward Vanhoutte, A Linkemic Approach to Textual Variation: Theory and Practice of the Electronic-Critical Edition of Stijn Streuvels’ *De teleurgang van den Waterhoek*. *Human IT* no. 1, vol. 4, 2000, p. 105. (Also available at URL: http://www.hb.se/bhs/ith/1-00/ev.htm). [Return to the text]

11. Fundamentally, the two directions in the choice of copy-text reflect different approaches to the productions of works. The manuscript oriented critics tend to see the literary work as created by one single author alone (the Romantic conception of author), while critics choosing an early print edition as copy-text rather consider the production as a collaboration between the author and other persons involved in the

editorial and publishing process. Renowned advocates of the former trend are G. Thomas Tanselle and Fredson Bowers: "[T]he editor must choose the manuscript as his major authority, correcting from the first edition only what are positive errors in the accidentals of the manuscript," Fredson Bowers, Some Principles for Scholarly Editions of Nineteenth-Century American Authors. *Studies in Bibliography* vol.17, 1964, p. 226. Cf. also Fredson Bowers, *Textual & Literary Criticism*. (The Sandars Lectures in Bibliography 1957– 58). Cambridge: Cambridge University Press, 1959, pp. 12 f. Well-known representatives of the latter trend are Philip Gaskell, Donald McKenzie, James Thorpe and Jerome J. McGann: "when a choice is to be made between author's manuscript and first edition . . . the presumption should lie with the first edition since it can be expected to contain what author and publishing institution together worked to put before the public," Jerome J. McGann, *A Critique of Modern Textual Criticism*. Chicago & London: University of Chicago Press, 1983, p. 125. For a presentation and discussion of the differences of opinion between "intentionalists" and "textual sociologists" see for example Johan Svedjedal, Textkritisk litteraturteori: Några linjer i svensk och anglosaxisk textkritisk debatt. In: Barbro Ståhle Sjönell, ed. *Textkritik. Teori och praktik vid edering av litterära texter. Föredrag vid Svenska Vitterhetssamfundets symposium 10–11 september 1990*. Stockholm: Almqvist & Wiksell International, 1991, 42–78. [Return to the text]

12. All information on the reconstruction of Dickens' Drawing Room is from the booklet *The Dickens House Museum: 48 Doughty ST London WC1*, Registered under the Charities Act 1960 as The Dickens House and Dickens House Fund [20 pages, bought in August 2000 at the museum]. [Return to the text]

13. On the concept of 'verkshöjd' see Henry Olsson, *Copyright: Svensk och internationell upphovsrätt*, 6 ed. Stockholm: Norstedts Juridik, 1998, pp. 53–63. [Return to the text]

14. "[T]he mere idea of the author is not protected [by copyright], only the expression of the idea. Thus the idea of a story of a boy and a girl who fall in love but come from feuding families is not protectable by copyright; on the other hand, the elaborated presentation of the story, placing it in a certain time and place, with developed characters and the interweaving of scenes and incidents, can constitute an expression of the idea and that expression can be protected." J. A. L. Sterling, *World Copyright Law. Protection of Authors' Works, Performances, Phonograms, Films, Video, Broadcasts and Published Editions in National, International and Regional Law. With a Glossary of Legal and Technical Terms, and a Reference List of Copyright and Related Rights Laws throughout the World*. London: Sweet & Maxwell, 1998, p. 190. [Return to the text]

15. IFLA Study Group on the Functional Requirements for Bibliographic Records, *Functional Requirements for Bibliographic Records: Final Report.* (UBCIM Publications New Series ; vol. 19). München: K. G. Saur Verlag, 1998, p. 16. (Also available on-line in a HTML version at URL: http://www.ifla.org/VII/s13/frbr/frbr.htm, and in a pdf version at URL: http://www.ifla.org/VII/s13/frbr/frbr.pdf).

In IFLA's terminology, the term "expression" is used to denote the realization of a work: *[E]xpression*: the intellectual or artistic realization of a *work* in the form of alpha-numeric, musical, or choreographic notation, sound, image, object, movement, etc., or any combination of such forms. An *expression* is the specific intellectual or artistic form that a *work* takes each time it is 'realized.'" (p. 18). Roughly speaking, the terminological pair, 'work' and 'expression', could be said to correspond to the distinction made in textual criticism between 'work' and 'text'. But, what in IFLA's terms might be described as an expression of a work would, in textual criticism, be considered a version of a work that in turn is presented as text. [Return to the text]

16. Tanselle 1989, p. 18. For a limited definition cf. Peter L. Shillingsburg: "A text is the actual order of words and punctuation as contained in any one physical form, such as manuscript, proof or book." Peter L. Shillingsburg, *Scholarly Editing in the Computer Age: Theory and Practice*. 3rd ed. Ann Arbor: University of Michigan Press, 1996, p. 46. Cf. also the Swedish bibliographer Rolf E. Du Rietz who reserves the term 'text' for mainly temporal works, Rolf E. Du Rietz, The Definition of 'Text'. *Text: Swedish Journal of Bibliography* no. 2, vol. 5, 1998, 50–69. For a discussion of Du Rietz's definition of 'text' cf. Mats Dahlström, När är en text? *Tidskrift för dokumentation* no. 2, vol. 54, 1999, 55–64. [Return to the text]

17. Cf. McKenzie's description of the Australian landscape as a text, where rocks, caves etc. are elements with a textual function. In fact, in the example given, McKenzie states that these objects are ingredients in a verbal text, since they all have a specific narrative function in a story, i.e. in the traditional narrative of the Arunta tribe, McKenzie 1999, pp. 39–43. [Return to the text]

18. These distinctions all deal with the famous question posed by F. W. Bateson: if *Mona Lisa* is in the *Louvre*, where are *Hamlet* and *Lycidas*? F. W. Bateson, *Essays in Critical Dissent*. London: Longman, 1972, pp.7–10. The matter had earlier been discussed by René Wellek & Austin Warren, *Theory of Literature.* 3rd ed. repr. (Pelican Books). Harmondsworth: Penguin, 1980, esp. Chapter 12, "The Mode of Existence of Literary Work of Art." In fact, Bateson draws on Wellek's chapter in his essay. Others who have tried to answer this question are, to mention only a few examples, Peter L. Shillingsburg, Text as Matter, Concept, and Action. *Studies in Bibliography* vol. 44, 1991, 31–82; James McLaverty, The Mode of Existence of Literary Works of Art: The Case of the *Dunciad Variorum*. *Studies in Bibliography* vol. 37, 1984, 82–105; Tanselle 1989; and Nelson Goodman, *Languages of Art: An Approach to a Theory of Symbols*. London: Oxford University Press, 1969. [Return to the text]

19. G. Thomas Tanselle, Textual Criticism and Deconstruction. *Literature and Artifacts*. Charlottesville: Bibliographical Society of the University of Virginia, 1998, pp. 234 f. [The essay was first published in *Studies in Bibliography* vol. 43, 1990, 1–33.] Quotation: Tanselle 1998a, p. 9. [Return to the text]

20. Johan Svedjedal has suggested the distinction between mainly temporal works and mainly spatial works, Svedjedal 2000, pp. 53 f. [Return to the text]

21. For an overview of what D. C. Greetham labels "textual bibliography," that is "the study of the textual implications and results of [the] process of making a bibliographical artifact," see D. C. Greetham, *Textual Scholarship: An Introduction*. (Garland Reference Library of the Humanities ; 1417). New York & London: Garland Publishing, 1994, Chapter 7 (quotation, p. 272). Cf. also Tanselle 1989, for example pp. 40 f., 45–47. Important to note, though, is that Tanselle finds these aspects insignificant (except in unusual cases) when reconstructing texts "intended by their authors" since the features of the document are not part of the "intended text," Tanselle 1989, pp. 91 f. [Return to the text]

22. Jerome J. McGann, *The Textual Condition*. (Princeton Studies in Culture / Power / History). Princeton, N. J.: Princeton University Press, 1991, pp. 77 f. [Return to the text]

23. McKenzie 1999, pp. 58–60 with references to John Kidd. For another account of the importance of considering the bibliographical code, see James McLaverty's analysis of Pope's *Dunciad Variorum* in the essay "The Mode of Existence of Literary Works of Art: The Case of the *Dunciad Variorum*," McLaverty 1984. Cf. also the concept of "document architecture," Mats Dahlström & Mikael Gunnarsson, Document Architecture Draws a Circle: On Document Architecture and Its Relation to Library and Information Science Education and Research. *Information Research* no. 2, vol. 5, 2000, URL: http://informationr.net/ir/5-2/paper70.html. [Return to the text]

24. I present only two common principles of categorization of the worlds of works, namely the temporality or spatiality of the work and its

intended existence in one or multiple copies. Naturally, distinctions can be made according to other parameters. Nelson Goodman, for example, distinguishes between works that can be falsified and those that cannot. In introducing the terms *autographic* and *allographic*, Goodman sets up the following criterion for autographic works: "Let us speak of a work of art as *autographic* if, and only if the distinction between original and forgery of it is significant; or better, if and only if even the most exact duplication of it does not thereby count as genuine." Goodman 1969, p. 113. For a discussion on Goodman's distinction, see D. C. Greetham, *Theories of the Text*. Oxford: Oxford University Press, 1999, pp. 41–43. Cf. also Mats Dahlström, Fejkat: verkförfalskning och digitalisering. *Ikoner* no. 2, 2000, 17–25. (Also available at URL: http://www.btj.se/press/publikationer/ikoner/arkiv/2000/pdf/00_2.pdf). [Return to the text]

25. See for example Tanselle 1989, pp. 27–33. [Return to the text]

26. Etching and lithography are examples of mainly spatial works intended to appear in several copies. Digital, mainly spatial works (and of course mainly temporal works) available on the Web follow the same principles. Due to the underlying, digital sequence of bits, it is generally possible for users to save a copy of these works on, for example, the hard drive, a floppy disc or a CD-ROM. [Return to the text]

27. G. Thomas Tanselle, Textual Criticism and Literary Sociology. *Studies in Bibliography* vol. 44, 1991, pp. 125 f. [Return to the text]

28. Tanselle 1991, n 64. [Return to the text]

29. Cf. Marie-Laure Ryan who discusses the virtuality of the (typographic) text and argues that virtuality is "the mode of existence of the text itself as mental object and linguistic artifact." "From the point of view of the reader," Ryan writes, "a text is like a musical score waiting to be performed; every act of reading constructs the text and actualizes its world in a different way." The virtuality of the text lies in this performance: "[t]he virtuality of texts and musical scores stems from the complexity of the mediation between what is there, physically, and what is made out of it," and, as "a generator of potential worlds, interpretations, uses, and experiences," the text is always "a virtual object," Marie-Laure Ryan, Cyberspace, Virtuality, and the Text. In: Marie-Laure Ryan, ed. *Cyberspace Textuality: Computer Technology and Literary Theory*. Bloomington: Indiana University Press, 1999, pp. 95 f. [Return to the text]

30. Tanselle 1989, pp. 48–53. [Return to the text]

31. Greg 1966. [Return to the text]

32. On the concept of version, see for example Tanselle 1989, p. 19 and Tanselle 1998b. Cf. also Shillingsburg 1996b, pp. 44 f. [Return to the text]

33. Letter from Charles Dickens (from Gad's Hill) to John Forster 1 July 1861, cited in Edgar Rosenberg, Dickens's Letters on *Great Expectations*. In: Charles Dickens, *Great Expectations: Authoritative Text, Backgrounds, Contexts, Criticism / Charles Dickens*, Edgar Rosenberg, ed. (A Norton Critical Edition). New York & London: Norton, 1999, p. 536. [Return to the text]

34. For a thorough discussion on the two endings, see Edgar Rosenberg, Putting an End to *Great Expectations*. In: Dickens 1999, 491–527. [Return to the text]

35. James Thorpe, *Principles of Textual Criticism*. San Marino, Ca.: The Huntington Library, 1972, pp. 185 f. [Return to the text]

36. Naturally, where the line of demarcation is drawn between one work and another vary largely between cultures, disciplines and scholars (as does the concept of what constitutes a work). Cf. IFLA Study Group on the Functional Requirements for Bibliographic Records 1998, p. 16. [Return to the text]

37. Cf. Tanselle 1989, pp. 19, 22 f. [Return to the text]

38. The term medium/media denotes many different things: it may refer to formal, material, structural or/and functional aspects in various contexts and thus be a concrete as well as an abstract entity. Cf. the definition in OED: "An intermediate agency, means, instrument or channel. Also, intermediation, instrumentality. . . ." In their discussion on new media in relation to old media, Bolter and Grusin define the term as: "The formal, social, and material network of practices that generates a logic by which additional instances are repeated or remediated, such as photography, film, or television," Bolter & Grusin 1999, p. 273.

In the present study, however, the term 'media' is principally used in two constellations, namely 'storage medium' and 'presentation medium', and refers to a physical item, to a material entity (such as a sheet of paper, a computer display or a cassette tape). [Return to the text]

39. For the term 'storage medium' cf. for example John W. C. Van Bogart, Magnetic Tape Storage and Handling: A Guide for Libraries and Archives, a report published by the Commission on Preservation and Access and the National Media Laboratory in June 1995, URL: http://www.clir.org/pubs/reports/pub54/; Martin Engebretsen, Tale – skrift – digital skrift: Om digitalisering og språklige funksjoner. *Human IT* no. 2–3, vol. 4, 2000, pp. 78 f. (Also available at URL: http://www.hb.se/bhs/ith/23-00/me.htm); Shillingsburg 1996b, p. 47; Jay David Bolter, *Writing Space: The Computer, Hypertext, and the History of Writing*. Hillsdale, N. J.: Lawrence Erlbaum Associates, 1991, p. 23; and Espen J. Aarseth, *Cybertext: Perspectives on Ergodic Literature*. Baltimore & London: Johns Hopkins University Press, 1997, pp. 10 f. Cf. also Ellmore's definition of 'medium': "medium. . . . The substance on which information is recorded or stored," R. Terry Ellmore, *NTC's Mass Media Dictionary*. Lincolnwood: National Textbook Company, 1991, p. 357.

Among textual critics the storage medium has been described in terms of carrier, vessel and vehicle. This emphasizes the main functions of the storage medium which are to preserve and transport texts, see for example Greetham 1994, p. 271 and Tanselle 1989, p. 40. [Return to the text]

40. Cf. Peter Shillingsburg's distinction between text and sign in his discussion on storage medium, Shillingsburg 1996b, p. 47.

In this paper, I mainly discuss texts that are stored as storage signs in storage media. Naturally, this is not to say that this is always the case. On the contrary, the distinction between storage signs and storage medium is not always possible, nor necessary. Take for example a marble sculpture or a glass vase where the material is also the sign; in other words, they are inseparable. [Return to the text]

41. Van Bogart 1995, Chapter 2.4. [Return to the text]

42. For a discussion on the differences between analog and digital systems and a comparison of the long playing record and the compact disc, see Ken C. Pohlmann. *The Compact Disc Handbook*, 2nd ed. Oxford: Oxford University Press, 1992, pp. 1–8. [Return to the text]

43. Van Bogart 1995, Chapter 2.4. [Return to the text]

44. For use of the term 'storage capacity' cf. Vanhoutte 2000, p. 109. [Return to the text]

45. Information on the multimedia edition of *Nationalencyklopedin* from the user's manual that comes with *Nationalencyklopedin multimedia*, ver. 2.0 on CD-ROM. Malmö: Bra Böcker, 1998. [ISBN 91-7133-573-0, 19 pages], p. 4. [Return to the text]

46. Paul E. Ceruzzi, *A History of Modern Computing*. Cambridge, Mass.: MIT Press, 1998, p. 69. On the development of hard drives, see also William Saffady, *Computer Storage Technologies: A Guide for Electronic Recordkeeping*. Prairie Village: ARMA International, 1996, pp. 2–18. [Return to the text]

47. The Preservation of Archival Materials: A Report of the Task Forces on Archival Selection to the Commission on Preservation and Access (April 1993). *European Research Libraries Cooperation: The LIBER Quarterly* no. 3, vol. 3, 1993, p. 297. [Return to the text]

48. Van Bogart 1995, Chapter 4. [Return to the text]

49. Marie Louise Samuelsson, *Lagra information på CD-R för framtiden*. (SP Rapport ; 1999:26). Borås: SP Sveriges Provnings- och Forskningsinstitut Kemi och Materialteknik, 1999 [SP Swedish National Testing and Research Institute, Report 1999:26], p. 46. [Return to the text]

50. Van Bogart 1995, Chapter 2.2. [Return to the text]

51. The difference in color and quality is due to the pigment used. Pigment is added to make the disc sensitive to light. This is necessary since it enables the inscription of storage signs. Samuelsson 1999, annex 2. [Return to the text]

52. Samuelsson 1999, p. 46. [Return to the text]

53. For a detailed description of the different parts of a magnetic tape and their process of degradation, see Van Bogart 1995, esp. Chapter 2. [Return to the text]

54. Cf. the definitions of 'land' and 'pit' in Ellmore 1991, pp. 318, 439. [Return to the text]

55. These pits in the polycarbonate are covered with a thin metal layer (e.g. gold, aluminum, or silver), which in turn is covered with a thin plastic layer for protection. For a thorough description of the physicality of CD-ROMs, see Ken C. Pohlmann, *Principles of Digital Audio*. 4th ed. New York: McGraw-Hill, 2000, Chapter 9. [Return to the text]

56. Jeff Rothenberg, Ensuring the Longevity of Digital Information, 1999, URL: http://www.clir.org/pubs/archives/ensuring.pdf, p. 2. [The paper is an expanded version of the article Ensuring the Longevity of Digital Documents. *Scientific American* no. 1, vol. 272, 1995, pp. 42–47.] The term "bit stream" is being used according to the definition given in the same paper: "We will use the term "bit stream" to mean an intended, meaningful sequence of bits (which may not be the same as the sequence in which they appear on some storage medium). A bit stream is simply a stream of binary digits, strung together in sequence," p. 2. [Return to the text]

57. Cf. "Only when records are held in responsible custody – that limits the extent of physical damage and slows the rate of deterioration – will life expectancy reach full term," The Preservation of Archival Materials: A Report of the Task Forces on Archival Selection to the Commission on Preservation and Access (April 1993), p. 297. [Return to the text]

58. Samuelsson 1999, p. 46. [Return to the text]

59. On reduced life expectancy due to frequent use, cf. Van Bogart 1995, Chapter 5. [Return to the text]

60. Pohlmann 1992, pp. 6 f., 51. [Return to the text]

61. R. Bruce Arnold, The Preservation of Paper: How Long Will the Page You Are Reading Last? *Serials Review* no. 4, vol. 23, 1997, p. 17. Quotation from p. 15. [Return to the text]

62. Van Bogart 1995, Chapter 2.4. [Return to the text]

63. Melissa Terras, Towards a Reading of the Vindolanda Stylus Tablets: Engineering Science and the Papyrologist. *Human IT* no. 2–3, vol. 4, 2000, 255–271. (Also available at URL: http://www.hb.se/bhs/ith/23-00/mt.htm). [Return to the text]

64. Cf. Aarseth's distinction between interface and storage medium, Aarseth 1997, pp. 10 f. To avoid the strong computer-related connotations suggested by the term 'interface' I choose to use the more neutral term 'presentation medium'. [Return to the text]

65. Arthur Conan Doyle, The Dancing Men. In: *The Return of Sherlock Holmes*. Richard Lancelyn Green, ed. with an intr. (The Oxford Sherlock Holmes/Arthur Conan Doyle, Owen Dudley Edwards, general ed.). Oxford & New York: Oxford University Press, 1993, 73–99. Quotation from p. 73. [Return to the text]

66. In reality, the majority of these examples consist of several presentation media, which together form a whole; a television set, for instance, includes both loudspeakers and a screen and the same goes for the computer display and the film screen, to which loudspeakers are often more or less attached. The tendency towards acknowledging what is visual rather than what is audible is also obvious in that we say that we *watch* movies and television without mentioning that an important and integrated part in experiencing works presented in these media is to listen while watching. Keeping this in mind, the different presentation media will, for practical reasons, be referred to in terms used in everyday speech. [Return to the text]

67. Peter L. Shillingsburg, Principles for Electronic Archives, Scholarly Editions, and Tutorials. In: Richard J. Finneran, ed. *The Literary Text in the Digital Age*. (Editorial Theory and Literary Criticism). Ann Arbor: University of Michigan Press, 1996, p. 24. [Return to the text]

68. Cf. Ellmore 1991: "device – a general term for electrical, electronic, or mechanical apparatus." Naturally, device is here to be understood as a system including necessary features such as cables, contacts, cords and current. [Return to the text]

69. Rothenberg 1999, p. 10. [Return to the text]

70. Ibid. [Return to the text]

71. By 'so-called electronic books or e-books' I here refer to certain electronic reading devices that are marketed as e-books or electronic books. However, the term 'e-book' is also widely used for electronic text in general and digital versions of printed works in particular. One of the

major sites for e-books, "Planet eBook," provides the following definition: "ebooks (eBooks, e-books, Ebooks...) can be anything from the digital version of a paper book, to more interactive content that includes hyperlinks and multimedia. It can even be the electronic reading device such as a Rocket eBook or Pocket PC," Planet eBook, ebooks glossary of terms 1.0. Binary Thing, 2001, URL: http://www.planetebook.com/mainpage.asp?webpageid=70. Cf. also Frederick G. Kilgour, *The Evolution of the Book*. New York & Oxford: Oxford University Press, 1998, Chapter 12, pp. 151–160. [Return to the text]

72. For more information on Rocket eBook, see http://www.rocket-ebook.com/enter.html. [Return to the text]

73. Cf. "computer – a device capable of receiving and storing a set of instructions, processing data, and supplying the results of the processing in a specified format. A general-purpose computer normally contains a CPU, a memory, and input/output facilities," Ellmore 1991. [Return to the text]

74. An overview of video formats (dating from 1956 to present time) and ratings of their obsolescence is provided by Sarah Stauderman at the web site Video Format Identification Guide, 2000, URL: http://paulmessier.com/videoid/. [Return to the text]

75. 'Lost' Nelson Mandela Court Recordings Retrieved by British Library, Press Release from The British Library, 11 February 2001, URL: http://www.bl.uk/cgi-bin/press.cgi?story=1071. [Return to the text]

76. Ceruzzi 1998, pp. 232, 266. [Return to the text]

77. Computer and digital storage media developments are extremely rapid and both hardware and software are short-lived. Hardware is estimated to become obsolete within five years, while software often appears in new versions more or less on a yearly basis. A file is closely tied to a specific software and even though there are some methods of getting around the problem, none of them has proved to be fully reliable. Many people consider that storing a text in ASCII format is a guarantee for future access to the stored text, independently of software and hardware. However, as Samuelsson stresses, this guarantee is in part illusory since the programs used to store text in standardized interchangeable formats often add program specific features to files by coding their structure and content, Samuelsson 1999, p. 7. [Return to the text]

78. Rothenberg 1999, p. 2. [Return to the text]

79. In *NTC's Mass Media Dictionary* a copy is, among other things, defined as: "A reproduction of an original work." and "A duplicate of a book, tape, film, and so on," Ellmore 1991, p. 141.

The concept of document as it is used in library and information science sometimes coincides with the term copy. However, the term document is somewhat wider and covers several aspects. Roughly, one could say that 'document' designates both the physical manifestation and the organization of the material in question. Unsurprisingly though, the term is the subject of intricate and delicate discussions among archival, library and information science scholars. In fact, the term document is not only used to designate 'copy' but also to designate what is here referred to as 'work' and 'text'. For an introduction to the term see, Michael K. Buckland, What is a 'Document'? *Journal of the American Society for Information Science* no. 9, vol. 48, 1997, 804–809. For a discussion on document and digital media, see also Dahlström & Gunnarsson 2000.

It should be noted also that IFLA uses the term 'item' for single exemplars: "The entity defined as *item* is a concrete entity. It is in many instances a single physical object (e.g., a copy of a one-volume monograph, a single audio cassette, etc.)," IFLA Study Group on the Functional Requirements for Bibliographic Records 1998, p. 23. [Return to the text]

80. Cf. Richard Weiner's definition of 'master': "a metal matrix, or mold, used in printing or other reproduction, such as phonograph recording; also, the original film, tape, or other item from which copies are made," Richard Weiner, *Webster's New World Dictionary of Media and Communications, Revised and Updated*. Rev. ed. New York: Macmillan, 1996, p. 364. [Return to the text]

81. Greetham 1994, p. 80. [Return to the text]

82. Ibid, pp. 77–80. [Return to the text]

83. Ibid, p. 141. [Return to the text]

84. Philip Gaskell, *A New Introduction to Bibliography*. Oxford: The Clarendon Press, 1972, pp. 116 f., 201. [Return to the text]

85. Electrotyping was another method for making plates of typeset pages. Instead of using plaster and molten metal as in stereotyping, the mold was made of wax and immersed in a bath of electrolyte. After several hours, a thin layer of copper forming the face of the plate appeared, onto which a strengthening leaden backing was then applied. Ibid, pp. 201–206. [Return to the text]

86. As indicated in the *NTC's Mass Media Dictionary* this is only one meaning of the word. Apart from this definition, 'impression' is also used to designate 1. a book reprinted without alteration; 2. a measure of how many copies that are printed per hour; and 3. the pressure of a type or plate against paper, Ellmore 1991, p. 289. [Return to the text]

87. As mentioned, this was because it was economically unfavorable and often practically impossible to keep entire books in standing type. Greetham 1994, p. 167. [Return to the text]

88. Cf. Tanselle 1989, p. 48 and Svedjedal 2000, p. 183. [Return to the text]

89. Gaskell 1972, p. 313. Cf. also Greetham 1994, p.167. [Return to the text]

90. Cf. the definition of 'edition' in Ellmore 1991, p. 196. [Return to the text]

91. Greetham 1994, p. 168. Cf. also IFLA's term 'manifestation' that more or less corresponds to 'edition' in this sense (and hence 'issue'): "As an entity, *manifestation*, represents all the physical objects that bear the same characteristics, in respect to both intellectual content and physical form," IFLA Study Group on the Functional Requirements for Bibliographic Records 1998, p. 20. [Return to the text]

92. Cf. Svedjedal 2000, p 121. On typographers and digital technique, see also Bolter 1991, pp. 65–68. [Return to the text]

93. Greetham 1994, p. 79. [Return to the text]

94. Cf. Gaskell 1972, p. 314. [Return to the text]

95. Greetham 1994, p. 143. [Return to the text]

96. Svedjedal 2000, p. 183. [Return to the text]

97. Since I wrote this section, *The Plant* has been taken down: "*The Plant* has furled its leaves for the time being. To receive notification when *The Plant* comes back online with new installments, please join the mailing list," Stephen King, The Official Stephen King Web Presence, URL: http://www.stephenking.com/. [Return to the text]

98. For a thorough description of the digitization of the critical edition of Almqvist's "Collected Works" see chapter 5 in *The Literary Web*, Almqvist on the Internet: The Digitization of a Critical Edition, Svedjedal 2000, pp. 175–196. The Internet version of the Collected Works is published at URL: http://scrooge.spraakdata.gu.se/lb/vittsam/. Digital critical editions of works by, for example, Geoffrey Chaucer, Henrik Ibsen, Søren Kierkegaard, and August Strindberg are also currently created. For a discussion on print and digital scholarly, critical editions, see for example Mats Dahlström, Drowning by Versions. *Human IT* no. 4, vol. 4, 2000, 7–38. (Also available at URL: http://www.hb.se/bhs/ith/4-00/md.htm). [Return to the text]

99. Svedjedal 2000, pp. 183 f. [Return to the text]

100. To describe in detail how copies of audible, cinematic and other audiovisual texts are manufactured from a master is not necessary nor possible in this study. What is important here is to show that the text of a mainly temporal work intended to be multiplied may be stored in various storage media. This can be done without an in-depth study of the technical processes involved in the manufacturing of copies of text stored on CD, CD-ROM, cassette tape, videotape etc. For a description of the manufacturing of optical discs, see for example Pohlmann 2000, pp. 270–275. For duplication of cassette tapes and videotapes, see Finn Jorgensen, *The Complete Handbook of Magnetic Recording*. 4th ed. New York: TAB Books, 1996, pp. 726 f., 765–767. [Return to the text]

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