

Whose writing is this?

Authenticity and reproduction in the digital world

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Abstract

Digital media are quite unlike the 'mechanical' reproduction media that figure so often in the literature of cultural and media studies. Both the interaction between author and user through the digital medium, and a number of other intrinsic qualities of many digital media lead to novel interpretations of the concepts of 'copy' and 'authenticity' in the digital world. Digital media re-introduce some aspects of authenticity that were lost through the use of purely mechanical media. Digital media also lead to new conceptions of authenticity and power, related to shifts of control from author to reader and from publisher to author, and a shift from mechanical reproduction to digital re-production. the paper concludes that digital media result in a reduction of commonality and shared reading experiences, and a re-definition of the concept of authenticity in terms of readership rather than authorship.

Introduction

Before discussing authenticity in the context of handwriting, I have to make a few observations about the background - information science and scholarly communication - from which I shall approach my subject.

Scholarly communication in the modern sense implies the distribution of multiple copies of an author's work, preferably on a global scale, although generally confined to a specific disciplinary field. It is one of the requirements of the scholarly communications systems that these copies have to be authentic, and that they have to remain authentic over time. This is not easy in a world where digital documents can be manipulated with ease, and where digital documents are inherently fluid and unstable. Therefore, authenticity is a problem that information science has to deal with.

The authentic copy

What do we mean by an 'authentic copy'? A copy of what? In the traditional world of print publication, the word 'copy' usually refers to an abstraction: the original text as established by the publisher. This is not necessarily the author's original text (often referred to as 'manuscript' even when it is not written by hand), and in fact it usually is not. As a result of the editorial and publication process the original text (i.e. the submitted manuscript) is changed, often quite extensively. In form and even in content, the publisher has the final say. In this case, 'authenticity' refers to the original published text, not to the original text that the author has submitted. The distinction between author and publisher is therefore relevant with regard to authenticity. Within the scholarly community, in the context of legal issues such as copyright, and for the practice of archiving, it is always the publication (rather than the manuscript or pre-print) that is considered to be the authentic work.

We can regard written communication as a sequential process in which, as far as publications¹ are concerned, various actors perform specific functions. In its most simple form, this 'information chain' consists of the triple Author - Publisher - Reader.² Each of these actors exercises some form of control over form and content. But to a large extent it is the publisher who is in control.

The locus of control as regards authenticity has been with the publisher for a considerable period of time, in fact it has been since the invention of the printing press. But this is now shifting in two directions as a result of the introduction of digital media:

- ▷ A shift back from publishers to authors. Many publishers now require authors to produce 'camera-ready copy'. This gives authors more control over the final publication. However, this is offset by publishers'

‘editorial policies’ that put strict requirements on the format to be used by the author. A more conspicuous shift towards author-control is self-publishing.³ Digital media give authors the opportunity to publish their works themselves, usually over the Internet, giving them almost total control over form and content (as well as over copyright - the prime motivation for Harnad’s ‘subversive proposal’).

- ▷ However, there is also a shift in the opposite direction. Digital media allow the reader (or ‘user’) a much larger amount of freedom for defining the visual characteristics of what they read. They also allow users to create their own, highly individual paths through digital content resources. This implies that users have not only more control over form and structure, but even in a pragmatic sense over content. By selecting and linking fragments of information, the user virtually creates his or her own work. The authors - if they exist at all - become mere suppliers of semantic components to the user.

Handwriting

The history of media has often been described in terms of major and minor revolutions. The idea behind such a revolution is that it introduces a new medium and a new communicative practice that emphasizes the characteristics of the new medium, and has little use for the characteristics of the previous one. In other words: it is often supposed that one medium kills the other. There is nothing new in this. The handwritten medium and the Latin language were effectively marginalized by the 20 million books produced by the printing press between 1450 and 1500 (Febvre and Martin (1958), see also Birkerts (1994)). It is perhaps also interesting - in the context of handwriting and the body - to note that print also destroyed the culture of orality: the practice of reading aloud to oneself and to others was replaced by silent declamation to oneself.

A fine example would seem to be the ‘revolution’ caused by the introduction of the keyboard as a medium for writing. For many the keyboard has not only destroyed the specific characteristics of handwriting, but even the ability of handwriting: ‘typing has ruined my handwriting’.

Now that the mechanical keyboard (typewriter) has been replaced by the digital keyboard (computer), it would seem that we have moved even farther away from handwriting. If the typewriter destroys handwriting, the computer must

destroy even more. However, this notion is not necessarily true.

Autography and authenticity

Our point of departure is autography's claim for authenticity (as opposed to *typed* writing): handwriting is 'an un-(ex)changeable, *unique and authentic* 'signature' that claims to guarantee the presence of an individual writer during an historically unique moment of writing'.⁴ In contrast, typed writing would have to be characterized as *allographic*, i.e. *iterable and reproducible*. The argument is then that with handwriting the medium does not only convey information, but also a physical token of identity as an authentic and recognizable expression of the writer as an individual, and that this form of authenticity is destroyed by the mechanization involved in typed writing.

However, handwriting can have no claim to this type of authenticity *per se*. Throughout the ages the culture and practice of handwriting has been based on standardization and elimination of personal characteristics. In mediaeval manuscripts it is often very difficult to distinguish between the hand of different scribes. Handwriting as learned in the classroom has always been highly standardized. Even nowadays the educational goal remains standardized, 'legible' forms of handwriting, and the Internet offers many solutions for achieving this goal, including computerized, interactive learning aids.⁵ Deviations from the standard are commonly described as 'bad' handwriting.⁶

This standardization is quite reasonable and understandable. At the end of the day, writing has a communicative function. Communications theory tells us that this requires the use of standardized encodings that are shared by both communicator and receiver. The 'authenticity' of handwriting therefore either stems from a person's inability to comply with the accepted standard (i.e. a lack of communicative skills), or the writer's wish to make a specific statement by not playing the game in the prescribed way. Enter the artist's dilemma: authentic communication requires breaking the conventional rules of communication.

Typed writing

Speed, standardization and reproducibility are three characteristics of typed writing that are perceived as advantages above handwriting. Standardization

guarantees a high degree of legibility and therefore supports the communicative function. Reproducibility in the context of typewriting means two things. First, however often and by whom a text is typed, it will always lead to more or less⁷ the same typographical result. But second, and perhaps more importantly, the typewriter offers the possibility of auto-reproduction: the 'carbon copy'. As such the typewriter is not really different from the printing press or even the scriptorium (as a highly standardized human copying machine). But what might be relevant as a phenomenon in the development of culture is that for the first time the typewriter allows for communication and reproduction of content without the intermediary form of handwriting: the author expresses ideas directly through the typewriter. There is no handwritten original, and this will become especially relevant in the context of digital media. Whereas with typewriting there still remains a physical object that could be referred to as the authentic original, that is no longer the case when a text resides in the computer memory only.

If we regard handwriting as a culturally significant phenomenon ('an un-(ex)changeable, unique and authentic 'signature' that claims to guarantee the presence of an individual writer during an historically unique moment of writing'), then we might argue that the author throws away his or her authenticity by submitting to the conveniences of the typewriter. And as far as the medium of writing influences the form and even the meaning of writing, the shift from handwriting to typewriting (and further to keyboard writing) is at least significant.⁸

It can be argued, however, that typewriting as a standardized form actually safeguards authenticity to a much higher degree than handwriting. This argument requires a different approach to the concept of 'authenticity'. At the level of connotation, of conveying meaning, handwriting is problematic. The more individual (i.e. 'authentic') the handwriting, the greater the danger is that the reader will misread, and therefore misinterpret the meaning of the author as expressed through the handwriting. As noted above, this communicative problem of handwriting is increased in the context of the 'artist's dilemma'. In other words, the authenticity of the text (its intended meaning) is undermined by the authenticity of the handwriting. In this sense, the typewriter and other systems of mechanical reproduction, including the digital keyboard, for the very reason that they comply more with the constraints of communication, will offer a greater chance than handwriting that the authentic meaning of the author will be communicated to the reader.

To a certain extent this paradox would seem to be merely semantic, involving

two conceptions of ‘authenticity’:

- ▷ Authenticity with reference to identity: ‘that’s me’ (authenticity type 1)
- ▷ Authenticity with reference to connotation: ‘that’s what I mean’ (authenticity type 2)

However, the problem is more intricate, and there is a continuing conflict between the internal authenticity of meaning and the external authenticity of signature. The enormous success of mechanical and digital media might indicate that most people find the former more important than the latter. Our rational Western culture values semantic meaning more than the mode of expression. Yet the preference of some people for handwriting in the face of increasing pressure to adopt standardized, mechanical and *networked* communication media, might point to the existence of two distinct psychological types (i.e. internal/mental versus external/visual).

Digital handwriting

The handwriting author has no more than pen and paper to manifest his/her identity. The digital author, on the other hand, has a vast array of means to create a personal *signature* in the visual construction of the text.⁹ Here there certainly is an advancement over the typewriter, if not over handwriting.

The main difference lies in design and parameterization of the signature. Design implies that the visual expression of content on paper or screen is governed by the intentional application of a schema or format that has been created consciously beforehand. In the digital context, this type of design is highly parameterized: it consists of a finite set of attribute/value pairs that determine specific characteristics of the visual appearance of the text. Superimposed on the basic design are the local choices of the writer to vary the parameters by altering their values. So the writer will choose an initial template or style sheet: a schema of layout elements such as font family, size, colour etc. In writing the author then may or may not deviate from this schema, e.g. by altering the size or using bold or italics to express emphasis.

It may be the case that the typographical variety available in digital typed writing is not significantly less than that available in handwriting. The main difference is that handwriting uses visual elements as a form of immediate,

graphical expression, whereas in digital writing expression is governed by the ability of the writer to command the machine, i.e. to control the application of typographical parameters. In this sense, ergodic reading¹⁰ is supplemented by ergodic writing. As everyone using digital writing tools knows, the flow of thought is continually interrupted by the need (or desire) to control lay-out and typographical parameters and in general be involved - at least to a certain degree - with the visual characteristics of the text.¹¹

Now one might argue that this is all very well, but that the essence of handwriting has to be found not in typographical elements (e.g. lay-out, size, colour etc.), but in the letter formation itself. The mechanical or digital writer has to choose from a finite set of prefabricated (one might say *industrial*¹²) fonts, whereas handwriting makes use of highly individual, personal letter formations. However, the borderline between handwritten letters and industrialized fonts has become more fluid. To begin with, there are now methods to create a personal font based on a person's own handwriting. On the Internet one can find commercial services: 'just send in your handwriting and we shall create your personal font'. Personal it may be, but it does remain a *font* in the traditional sense: a fixed set of tokens, where every 'a' is identical to every other 'a'. However, recent rule-based technologies now allow for seemingly endless variation of letter forms within a personalized font.¹³ Digital media are re-creating the illusion of personal handwriting while retaining all other characteristics of digital writing, including reproducibility and parameter control. One could argue about how *echt* this form of digital handwriting is. But it is perhaps at least relevant to note that there is apparently a need (and therefore a market) in the digital world for something that will at least provide the illusion of personal handwriting. A more recent example of the other way round is a form of digital handwriting recognition that is not based on standardized tokens imposed on the writer (as in most personal digital assistants), but that recognizes individual handwriting.¹⁴ Of course, this is just a specific example of remediation¹⁵: man may change media, but media do not change man.

No copy, no history

Our thinking about information and media is to a large extent based on a conduit model¹⁶ (sender-medium/channel-receiver). This model implies, amongst many other things, authorship and authenticity, i.e. that a message as received should be identical to the message sent. Authenticity therefore also

implies that the message must be stable over time (i.e. between sending and receiving).¹⁷ That this is not always the case, is perceived as a communications problem, to be resolved by perfecting the communications system. But in the digital world, things can be different. What if authorship and authenticity are *intentionally* left out?

Much information is generated by processes and systems (e.g. sensors, surveillance camera's). It is difficult to understand who or what the author is in these cases. The concept of 'meaning' in the absence of an author is problematic, as is 'authenticity'. But stability over time can be even more contentious. Within the prevailing concept of a communications system, information is always by definition *old* information: images of history, of what has been. It pertains to something from the past that is being conveyed over time and space to the reader. However, digital media allow the communication of *real-time* information that pertains to the exact moment that it is received. A moment later the information is no longer valid, and it has to be refreshed. Here, authenticity depends on immediacy and therefore has to be characterized as 'zero-duration authenticity'.

Even traditional media such as the newspaper move in this direction once they go online. Shayla Thiel has devoted an interesting discussion to online newspapers in which she describes the medium as an *experience* rather than as a product Thiel (1998). The online newspaper changes from moment to moment¹⁸, and is also highly personalized. Not only traditional documentary characteristics such as quality markers and context indicators disappear, but the entire concept of 'authenticity' has shifted from the author to the reader. It is no longer an authentic expression of the writer as an individual. What counts is the reader's feeling of authenticity: whether the newspaper (or any other digital format) provides an authentic experience and gives the reader the illusion of active involvement in the dynamics of the world around him. But, as Thiel observes, the online newspaper is 'more concerned with look and feel than with getting the best news and information'. Thiel is sceptical about this development towards ephemeral media, but she also argues that it is well adapted to the postmodern culture of our times, and of future generations of readers.

However this may be, the example shows that with highly dynamic digital media, there is no author, no original, no copy, no authenticity, nothing to preserve, and therefore no history.

Reading as a collective experience

The lack of fixity has more significance than a mere lack of history - if there is nothing to record, who cares about history? However, it also has profound implications for the role of information in providing a cultural context for communication and in creating collective experiences and group identities. To explain this, we must return to handwriting. In terms of communication, from the reader's viewpoint, handwriting is *personal* in the sense that it is directed towards you as the intended reader or at least as a member of a limited group of readers. The direct communicative characteristic of handwriting stems to a large degree from the fact that the author usually knows the reader(s), and intentionally communicates with him/her/them through the medium of handwriting. Typed writing on the other hand, because of its potentially allocutive character, can be directed to a larger group of anonymous readers. Handwriting resembles conversation, whereas typed writing resembles declamation. Handwriting emulates the body language and tacit knowledge sharing of direct interpersonal interaction, whereas typed writing has to revert to rhetorical techniques to achieve the same communicative results.

One of the most fundamental (though often neglected) consequences of typed writing and other allocutive media, including print, is the creation of *shared reading experiences* amongst groups of people. In the context of handwriting, people can (or have to) tell each other about what has been written to them. In the context of typed writing, people can discuss shared content (knowing or assuming that they have all received the same information), or (perhaps unconsciously) act and cooperate on the basis of shared information (hence the concept of 'common knowledge').

Shared knowledge and - more generally - shared symbolic materials are the basis of any cultural community and identity, and even of the definition of the 'self' as individuality with reference to a common ground. Thompson (1995) describes the shift from 'local knowledge' acquired in the context of face-to-face interaction to a process of self-formation dependent on access to mediated forms of communication. As long as there exists a relatively limited repertoire of symbolic materials, this shift need not necessarily destroy the common ground for human interaction and co-existence. To a certain extent the rise of mediated forms of communication and informing has widened the common ground to facilitate interaction between individuals and groups who formerly might not have had anything to share. But the culturally significant switch from individual to shared knowledge that was brought about

by the gradual move from handwriting to typed writing is now being reversed through digital media: reading is becoming a more individual rather than a collective experience. The disappearance of collective reading experiences, and therefore the elimination of shared contexts, is problematic to say the least. Imagine the difference between a classroom (or board meeting) where all attendants have read the same materials with one where all attendants have read entirely different materials - not once but for most of their lives.

There are various reasons why this shift towards individualization of reading experiences is happening. One is the use of highly adaptive, interactive and hypertextual digital media. This means that the information presented to the reader, and the path traversed by the reader through the available information, is highly individual and contextualized. This is not only true in the sense that the reader constructs a reading experience from loosely linked fragments, but also in the way even literary texts can be transversed once they are available in hypertext form (Svedjedal (2000)). Another reason is the availability to the user of enormous amounts of information on any topic, diminishing the statistical likelihood that two people will obtain the same information.

The elimination of shared contexts is one of the most problematic effects of digital media. What it will mean for communication in general, and for self-perception, group identity and even the concept of distinct 'cultures' remains to be seen. With regard to authenticity, it could be argued that where there is no common ground, every utterance and every experience is 'authentic'. But when everything is authentic, the whole concept loses its meaning. If digital media do indeed destroy authenticity, it is precisely because they destroy commonality.

Contextualizing identity

Let us now return to questions of authenticity and copy. Since the very beginning of printing, there has been a tension between the author and publisher as regards identity. For the author, the work published is his or her work, and should be recognizable as such. The publisher of the 16th century, however, had little concern for the author, whom he would regard as a mere supplier of raw materials. The published text was the publisher's work, and the transfer of copyright from author to publisher that is still common today underlines that in this respect little has changed since the 16th century.

It is important for the publisher that his work is recognizable, i.e. that it

has an identity, and that it can be seen to be an authentic work of the publisher. This underlines the fact that ultimately a publication is a product rather than a 'work'. For any product, the producer will seek a certain profit on the cost of developing, making and selling the product with a given functionality. Within these financial constraints, the producer has some degrees of freedom to vary the ergonomic and aesthetic characteristics of the product. These characteristics often distinguish a product from a competitive product with similar functionality, i.e. they define the product's *identity* (as contrasted with its functionality), and by proxy the producer's identity as well. For the products of a publisher the aesthetic identity is determined by factors including typography, page design, and citation style. We all recognize a Penguin when we see one, and a doctor will not mistake Nature for a Lancet.

The commercial importance of product identity is one of the reasons why publishers (and their predecessors, the printers) have taken over the locus of control over what constitutes the authentic work. They could do so because ultimately the copy has a far greater communicative and economic significance than the original. The singular authenticity of the original had to lose out against the multiplicity and authority of the copy.¹⁹

It has already been indicated that the locus of control is now partly shifting towards the user. ICT-solutions allow the user a certain degree of freedom to vary the visual parameters (e.g. font type and size, line length, colour, inclusion/exclusion of images, and even (e.g. using XML) style of headings, citation style, link style etc). This subverts the producer's attempts to force his own aesthetics and identity on the reader.²⁰ At that stage, we are far off from the authentic handwriting of the author, who cannot even know how his text will look like when it reaches the reader.

On the other hand, the author in the digital world has far more opportunities for creating an informational identity than in the era of print or handwriting. One example is self-publishing on the Internet, which puts the author in far more control, even though he is still bound to numerous conventions - from the rules of scholarship to the prevailing standards and formats on the Internet. What in fact is happening is that the 'identity' of the author is becoming bound to his or her *network presence*: 'I know you from your home-page'. If we regard the visual expression of network presence as a form of virtual handwriting, then this is indeed a complex concept. It could even include the perceivable links to other authors as a network of mental relationships: 'I am whom I link to'.²¹

In this way, authenticity becomes a matter of contextualization. It is not the text and its form of expression, nor the author's signature that defines authenticity. The author's 'signature' emerges from the context into which the text is embedded, the relationships with other texts and individuals and groups. On the other hand, the reader creates an authentic reading experience through exactly the same process of contextualization, by interactively linking objects (texts, people, institutions...) in information space to create the unique, personal work that shapes his identity and that nobody else can have access to.

Digital authenticity

There is a great deal of discussion about the concept of 'authenticity'. For archivists, an 'authentic' document is either the original, unmutated document, or an exact and certified copy. For the author, a document is the expression of his or her ideas, opinions and beliefs. It is authentic precisely because it relates to my identity as an author. That is what modern authorship is about, and why works are not published anonymously. It also explains why plagiarism produces highly emotional reactions and severe penalties: it is not about stealing information, but about negating the author's identity.

But since a document is an expression of *me*, I might wish it to change when *I* change, otherwise it would not be *me* any more. One of the conspicuous characteristics of *self publishing* by scholars and scientists is that they tend to revise their 'publications' continuously. The 'authentic' document is therefore the one that reflects my current ideas, opinions and beliefs, not those I had and now want to distance myself from.²²

These considerations allow us to introduce two further connotations of 'authenticity' that are applicable in the fluidity of the digital environment:

- ▷ *fixity* ('original authenticity'): 'that was me then; it's not me anymore'.
- ▷ *currency* ('actual authenticity'): 'that's me now'.

A different way at looking at this is to regard mental work as an ongoing activity, i.e. as a *process*. Documents themselves can be seen as a reflection of this process, developing and changing as the mental process unfolds. From this viewpoint there is no 'final' or 'authentic' version. However, one of the dogmas of scholarly publishing is that a publication is an 'official record' to

be entered into the ‘canonical archive’ (Rowland (1997)) of science. The shift in meaning of ‘authenticity’ as a result of the way writers make use of digital technology will therefore have a significant impact on the role of publications in the scientific process, and on the way we record and preserve scholarly output.

Conclusions

This essay is little more than a series of observations by an information scientist on a topic with which he is not intimately familiar. Nevertheless some conclusions can be drawn. One is that the concept of ‘authenticity’ is complex and problematic. In fact, it is a multidimensional concept that can refer to:

- ▷ either the person (e.g. the author) or the object (e.g. the ‘document’)
- ▷ either the author’s ‘identity’ or his/her ‘meaning’
- ▷ either the historical moment of creation or the ‘here and now’

We argue that handwriting is an expression of the author’s identity at the moment of creation, whereas a continually updated digital document would reflect the author’s current authentic self. What is truly authentic is a matter of purpose.

A further observation is that the concept of ‘copy’ is problematic in that it presupposes an ‘original’. It could be argued that mechanical systems such as the typewriter produce nothing but copies (or, if you prefer, originals), whereas in a digital context it could even be said that copies do not exist, i.e. every user is looking at the same ‘original’.²³

At the same time, we have argued, users have the option to re-create the original, i.e. to impose their own expression of ‘identity’ (or at least of taste) and even meaning on the document. They even have (and use) the opportunity to create their own, authentic reading experiences from fragmented materials floating around in cyberspace. This is a result of the shift of the locus of control from the author, via the editor/printer/publisher, to the user. Simultaneously, the author is regaining control over his own work back from the publisher, allowing her to use digital media in creating a virtual handwriting within the context of network presence.

A further observation is related to the idea that the ‘authenticity’ of handwriting (in the sense defined at the beginning of this paper) has to be seen as the individual deviation from common backgrounds and shared standards. To the extent that digital media destroy this commonality and enforce heterogeneity of information experiences, the idea of authenticity in this sense may lose its meaning

There are two reasons for the loss of a handwriting culture. One is the act of and desire for multiplication and multiplicability. Multiplication, and the use of technical and digital means that make multiplication possible, distance both author and reader from the authentic expression that handwriting can be considered to be. That is the price one has to pay for reaching a wider audience than handwriting can address. The other reason is the desire to have greater control over the communication process. This is a complex issue. It involves the use of standardized technical means to overcome shortcomings in the technique of handwriting. It also involves attempts to control what happens at the receiver end of the communication chain by preventing false, i.e. non-authentic interpretations. That this attempt is futile, at least in the digital world, is clearly demonstrated by the amount of control the ‘end-user’ has over layout, structure, sequence and relationships within the body of information available in the digital environment. In this sense, not only ‘copy’ and ‘authenticity’ have lost their meaning, but the entire concept of ‘authorship’ as well. To the extent that the digital medium rapidly is becoming the *only* medium, authenticity has shifted from the author to the reader. Perhaps it is a characteristic of a consumer society that the authenticity of reading has taken preference over the authenticity of writing. The tragedy is that whoever wishes to return to the authenticity of handwriting and thus to authorship, must inevitably lose his readership. What we see, then, is a struggle for power between writer and reader: the writer attempting to create an authentic expression of ideas, opinions and feelings; the reader attempting to create his or her own, ‘authentic’ text from the digital resources available.

This paper has explored the concepts of ‘authenticity’ and ‘copy’ in the digital world. There are no final conclusions to be drawn, other than that these are elusive concepts that should be used with care.

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Notes

1. A publication is defined here as a text that has been made publicly available in any form, allowing undefined users to access its contents by any means.
2. See Duff (1998), Mackenzie Owen and Halm (1989).
3. See Harnad (1995).
4. Quoted from the introductory text of the conference programme.
5. See <http://www.handwritingforkids.com/handwrite>
6. It is interesting to note that the revival of handwriting in the form of calligraphy (e.g. as practised within the 'Arts and Crafts' movement of the late 19th century) is based on highly standardized historical examples - such as insular, carolingian and gothic scripts - for its letter forms. When calligraphy deviates from these historical forms, it often shifts towards a purely visual art form where communicating the original meaning of the text is hardly important, or of no significance at all.
7. More or less: i.e. on the same machine and excluding typing errors and deviations in page-layout.
8. For instance, various contributors to Guntjahr and Benton (2001) argue that the visual representation of a text is a component of its meaning. see also Olson (1994). Ferris (2002) even argues that the act of writing itself is transformed by digital media, becoming more like a conversational communication act.
9. Jerome McGann even argues that print's material (as opposed to handwriting's bodily) contingencies open the text in the sense that it can acquire multiple and endlessly possible manifestations (McGann (1991)). Digital media are, of course, no different in this respect.
10. See Aarseth (1997).

11. There do exist writing tools that purport to free the author from such concerns. These *mark-up languages* such as T_EX and L^AT_EX and SGML are based on the concept of intentionality rather than control, e.g. the writer only indicates the intention that a textual element should be a heading or should be emphasized. The ‘programme’ then applies typographical rules to create the intended lay-out and typographical characteristics. Lyx (cf. www.lyx.org), an open-source word processor based on these principles, advertises itself as ‘what you see is what you mean’ rather than the WYSIWYG of standard word processors such as Word. This paper has been written with Lyx. In the experience of this author, the relationship between typography and meaning is such that intentional writing tools cannot relieve him during the writing process from concerns about the final visual result.
12. See also Ong (1982).
13. See http://www.vletter.com/design_visitor.htm: to make a natural-looking handwriting style, multiple forms of each character need to be used. This is because the shape of each character depends upon the shape and type of connection of each surrounding character. vLetter calls this a contextual font. In addition, each font has a slightly different way to connect each letter since each handwriting style is slightly different.
14. See http://pi.parascript.com/piweb/products/ritescript/rscr_proinfo.asp The idea is similar to speech recognition systems. What is interesting is that the computer will understand your speech or handwriting, with the sole intent to transform it immediately into computer code. ‘For that’s the stuff electronic texts are made of’ (Kirschenbaum (2001))
15. See Bolter (1999, 2001).
16. Day (2001b), ch. 3.
17. In the context of written, printed and digital (i.e. *documentary*) media the time between sending and receiving, and therefore the required lifetime of the medium, can be extremely long, even spanning centuries. Stability over time is therefore a culturally significant requirement for any system for documentary communication.
18. Although even printed texts ‘do not stay themselves’, argues Matthew Kirschenbaum, electronic information ‘has a natural inclination to change, to grow and finally to disappear’ (Kirschenbaum (2001)).

19. For this is another reason for the power of the publisher, especially in scholarly publishing: the publication (i.e. the copy rather than the original) obtains its authority from the fact that it is certified by the scholarly community through the peer review process. The lack of certification is also the weakness of the authentic version as held by the author (Kling and McGim (1999), Rockwell and Siemens (2000)), a weakness that is transferred to the digital pre-print repositories that are now multiplying under the 'open archives initiative' (see <http://www.openarchives.org/> and Day (2001a), Rusch-Feja (2002)). A number of solutions have been proposed, e.g. involving readers in the peer review process (Arms (2002), Harnad (1996), Nentwich (1999), Roberts (1999), Weller (2000)).
20. This explains why publishers prefer secure formats such as PDF above HTML.
21. This form of contextualization is becoming increasingly important in the digital environment. It relates to an aspect of 'collective identity' that is not specific for digital media, but that is greatly facilitated within a digital environment, viz. multiple (i.e. collective) authorship. Multiple authorship is the outcome of a number of trends, the most important of which is the growth of international collaborative research projects made necessary by the scale and cost of contemporary scientific problems, and facilitated by the global communication facilities of the Internet and the digitization of the research process itself, culminating in the emerging concept of *E-science* (see De Roure et al. (2003)).
22. There are various technical solutions that facilitate this. One solution is to allow a document to have an embedded history, i.e. to make it consist of the accumulation of consecutive versions, although an author might not want to be associated with ideas that he or she no longer endorses. There exists versioning software that tracks differences between documents and re-creates a version on the basis of the original and a series of recorded differences. It is, of course, also possible to do this the other way round, i.e. to retain the latest version and to derive previous versions from there. Primitive forms of versioning are a standard functionality of word processors. Wagner and Graham (1997) describe the concept of versioning as an intrinsic functionality of digital documents.
23. A contrasting view is offered by Levy (1999) who suggests that a digital document should be regarded as a 'mini printing press' that sends copies of itself to anyone requesting it to do so. He also puts forward the interesting notion that documents are 'objects with the power of speech', things that we send out into the world to tell our story.

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