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Authenticity and Objectivity in Scientific Communication: Implications of *Digital Media*

Introduction

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 production to digital reproduction. In addition, 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. These are issues that are of growing importance for scientific communication that is becoming almost totally dependent on digital media.

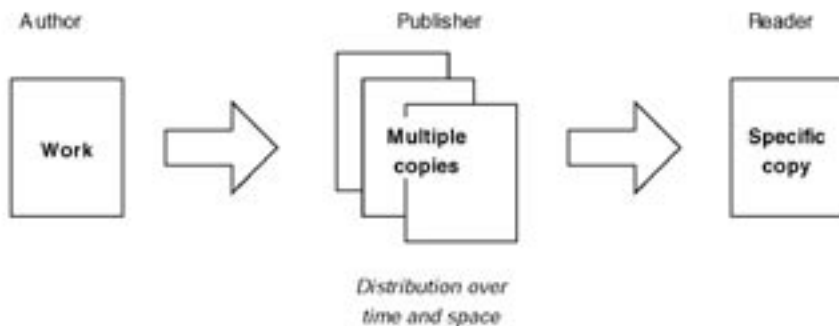
Scientific communication in the modern sense implies the distribution of multiple copies of an author’s work, preferably on a global scale, although generally confined to a specific disciplinary field. It is one of the requirements of the scientific communication system that these copies are ‘authentic’, i.e., exact copies of a certified original, and that they remain authentic over time. This is not easy in a

world where digital information can be manipulated with ease, and where digital documents are inherently fluid and unstable. In addition, scientific information is required to be ‘objective’ and therefore to abstain from devices that enhance self-expression rather than content. As we shall see, digital media offer both authors and readers various opportunities for self-expression in the communicative act. Since ‘authenticity’ may refer to an original, but also to originality, the concept of authenticity becomes highly problematic in the context of digital media.

The Authentic Copy

What do we mean by an ‘authentic copy’? 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, certification, and publication processes, the original text (i.e., the submitted manuscript) is changed, often quite extensively. In form and even in content, the publisher (or the publisher’s proxy, the editor) 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 scientific 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.

Written communication can be regarded as a sequential process in which, as far as publications are concerned, various actors perform specific functions.¹ In its simplest form, this ‘information chain’ consists of the sequence Author-Publisher-Reader (Illustration 1).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 regarding authenticity has been with the publisher for a considerable period of time, in fact it has been there 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, but also a shift from authorship to publishing.

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* (Harnad 1995). Digital media give authors the opportunity to publish their works themselves, usually via 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 readers (or 'users') much more freedom to define 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 not only have more control over form and structure, but also, 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. It is true that in the transition from one medium to another, a certain amount of remediation takes place. But eventually the old medium disappears as a technological artifact, and with it many of the cultural practices, forms and genres that surrounded it disappear as well. 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). Print also destroyed the culture of orality: the practice of reading aloud to oneself and to others was replaced by silent reading.

A later example is 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.³ Now that the mechanical keyboard (typewriter) has been replaced by the digital keyboard (computer), we have moved even further away from handwriting.

Autography and Authenticity

If the typewriter destroys handwriting, it might be thought that the computer must destroy even more. What, in fact, is being destroyed, is authenticity in its most immediate form, and in a sense is very different from that described above in the context of scientific communication. Autography's claim for authenticity (as opposed to *typed* writing) is based on a conception of handwriting as '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., iterative and reproducible. The argument, then, is 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 has no claim to this type of authenticity *per se*. Throughout the ages, the culture and practice of handwriting has been based on standardization and the elimination of personal characteristics rather than idiosyncrasy. 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. Communication theory tells us that it benefits from 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.

The conclusion for scientific communication is clear. The scientist is not an artist, and the expression of his or her personality is not part of the game. The shift from handwriting to standardized, mechanized writing is but one of the dimensions of the shift towards objectivity in scientific communication over the centuries (Gross et al. 2002).⁷ For scientific communication, then, the question is whether digital media sustain the required objectivity, or regress towards increasing subjectivity.

Typed Writing

Speed, standardization, and reproducibility are three characteristics of typed writing that are perceived as advantages over 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 whomever a text is typed, it will always lead to more or less the same typographical result.⁸ 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 by means of the typewriter.⁹ 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 solely in a computer’s memory.

If we regard handwriting as a culturally significant phenomenon, then we can argue that the author relinquishes his or her authenticity by submitting to the conveniences of the typewriter: the written object might as well have been created by somebody else. 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 the very least significant.¹⁰

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, offers 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’:

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

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., external/visual/subjective/artist versus internal/mental/objective/scientist).

Digital Handwriting

The expression of identity is related to the expressiveness of the medium. 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.¹¹ Here there certainly is an advantage over the typewriter, if not over handwriting.

The main difference lies in the 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 can choose an initial template or style sheet: a schema of layout elements such as font family, size, color, etc. In writing, the author then may or may not deviate from this schema, e.g., by altering the font, size or by using bold or italics to express emphasis.

The typographical variety available in digital typed writing is therefore not necessarily 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* reading is supplemented by *ergodic* writing (Aarseth 1997). As everyone using digital writing tools knows, the flow of thought is continually interrupted by the need (or desire) to control layout and typographical parameters and in general be involved – at least to a certain degree – with the visual characteristics of the text.¹²

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., layout, size, color, etc.), but in the letter formation itself. The mechanical or digital writer has to choose from a finite set of prefabricated, *industrial* fonts, whereas handwriting makes use of highly individual, personal letter formations (Ong 1982). 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 that offer to create a personal font based on an example of the client's handwriting. Personal this 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 a seemingly endless variation of letter forms within a personalized font.¹³ Digital media are re-creating the illusion of personal handwriting while retaining all of the 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 reverse 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

No Copy, No History

Our thinking about information and media is to a large extent based on the well-known conduit model that describes information as flowing over a system consisting of at least a sender/origin, a medium/channel and a receiver/destination (Reddy 1993; Day 2001, chapter 3). This model implies, amongst many other things, authorship and authenticity, i.e., that a message as received should be identical to the message sent.¹⁵ Authenticity therefore also implies that the message must be stable over time (i.e., between sending and receiving).¹⁶ 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 cameras). 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 can 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 moment, and is also highly personalized.¹⁷ 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. There 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 skeptical about this development towards ephemeral media, but she also argues that it is well adapted to the postmodern culture of our times, and to 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. It is precisely these characteristics that prohibit such media from playing a role in the world of objective knowledge and scientific communication.

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 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 at 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 in order to achieve 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 each of them individually. In the context of typed writing, people can discuss shared content (knowing, or at least, assuming that they have all received the same information), or, perhaps unconsciously, act and cooperate on the basis of shared information. Scientific communication is based on this concept of shared reading experiences, assuming access to, if not familiarity with, the shared body of knowledge stored in the 'canonical archive' of science and embodied in scientific texts through a network of references (Rowland 1997). 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 coexistence. 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 in-

dividual 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 and less 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 of the attendants have read the same materials with one where all of the 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 hyper-textual 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 that literary or scientific texts can be traversed 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.

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. 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. When background knowledge cannot be assumed, and when even a reference (e.g., a hyperlink) need not necessarily imply that the reader will encounter the same information as the author, the ideal of objective knowledge might break down, and knowledge will mean little else than what one happens to know.

Contextualizing Identity

Since the very beginning of printing, there has been a tension between the author and publisher with regards to 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 material. 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 to the publisher that his work be recognizable, i.e., that it has an identity, and that it can be seen as an authentic work of the publisher. This underlines the fact that, ultimately, a publication is a *product* rather than a ‘work’. The producer seeks a certain profit on any product over the cost of developing, making and selling it. Within these financial constraints, the producer has some degree of

freedom to vary the ergonomic and aesthetic characteristics of the product. These characteristics often distinguish one product from another, i.e., they define the product's *identity* (as opposed to 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 the *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 were able to do so because the copy ultimately 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.¹⁸ But at the same time the control invested in the publisher resulted in a tightly organized system of certification, distribution, and archiving that created a Popperian 'World 3' of objective scientific knowledge. Without this center of control, scientific information would have remained 'authentic' in that other sense: the subjective expression of the individual author. Scientific knowledge as we know it would not exist, there would be only scientific opinion.

However, it has already been indicated that the locus of control is now also partly shifting towards the user. ICT solutions allow the user a certain degree of freedom to vary the visual parameters such as font type and size, line length, color, inclusion/exclusion of images, and even style of headings, citation style, link style, etc. This subverts the producer's attempts to force his own aesthetics and identity on the reader.¹⁹ At this stage, we are far off from the authentic handwriting of the author, who has no way of even knowing what 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 the creation of an informational identity than in the earlier eras of print or handwriting. One example is self-publishing on the Internet, which puts the author in 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'.²⁰

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 in information space to create the unique, personal work that shapes his identity and that nobody else will have access to.

Digital Authenticity

The use of digital media in contexts where information is used to create permanent records has resulted in a great deal of discussion about the concept of ‘authenticity’ amongst information professionals. 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 his or her 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 if a document is a personal expression of its author, he may wish it to alter it as he himself changes, otherwise it would not be *him/her* any more. One of the conspicuous characteristics of *self-publishing* by scholars and scientists is that they tend to continuously revise their ‘publications’. The ‘authentic’ document is therefore the one that reflects the author’s current ideas, opinions, and beliefs, not those he once had and now might want to distance himself from.²¹

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

- Type 3: original authenticity (‘that was me then; it’s not me anymore’)
- Type 4: current authenticity (‘that’s me now’).

A different way of 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 scientific publishing is that a publication is an ‘official record’ to be entered into the ‘canonical archive’ of science. The shift in meaning of ‘authenticity’ as a result of the way writers make use of digital technology could therefore have a significant impact on the role of publications in the scientific process, and on the way we record and preserve scientific output.

Summing Up

One conclusion that we can draw from all this 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’) and its content
- 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 then a matter of purpose.

Another observation we can make 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 one prefers, 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'.²²

At the same time, users have the option to re-create the original, i.e., to impose their own expression of 'identity' 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 her own work back from the publisher, allowing him/her to use digital media in creating a virtual handwriting within the context of her network presence.

Another observation is related to the idea that the 'authenticity' of authorship 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 the heterogeneity of information experiences, the idea of authenticity in this sense may lose its meaning.

Handwriting is the ultimate form of authentic expression through the use of graphical/symbolic devices to the extent that handwriting knows no copies, but only originals. The culture of handwriting has disappeared for two reasons. One is the act of and desire for multiplication and multiplicability that was served in timely fashion by the invention of the printing press (but existed long before that event in the mediaeval copy shops). Multiplication, and the use of technical and digital means that make multiplication possible, isolates 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 mere handwriting can address. Another reason is the objectivity required by the modern scientific enterprise, which can only be achieved through the centralized, standardized, and certified procedures developed over the centuries by scholarly publishers.

A third 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 is rapidly becoming the primary 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. What is clear is that 'authenticity' acquires entirely new meanings in a digital world that empowers authors and readers with more control over form, structure, and content than ever before.

These new forms of authenticity could easily diminish the objectifying role (in terms of certification, standardization, and archiving) of the publisher and might eventually reverse the trend towards objectivity that has characterized the development of scientific communication since the 17th century. Increasing the authenticity of both writing and the reading experiences through digital devices can only result in a more subjective grounding of communication. However, science has no need for a 'unique and authentic signature' for its authors, and should be capable of resisting the temptations offered by the digital medium for regressing towards a more subjective mode. Preliminary empirical research shows that the specific characteristics of the digital medium that might move science from its objective stance towards more subjectivity are not yet reflected in the primary medium of research: the peer-reviewed scientific article (Mackenzie Owen, forthcoming). But there are many indications that scientific readers do create their own traversals through information space, especially when publications are heavily hyperlinked. It will be interesting to see how this will develop, and whether authors and readers will continue to accept objective and authoritative sources above new forms of digital 'authenticity'.



SIGN HERE!

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 and Mackenzie Owen and Van Halm 1989. The publisher can be defined as the actor responsible for creating and distributing multiple copies of the author's work.
3. Often expressed as 'typing has ruined my handwriting'.
4. Quoted from Sonja Neef, *Handwriting as a cultural practice in the age of new media*. Proposal to NWO.
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 practiced 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 letterforms. 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 of less importance, or of no significance at all.
7. Scientific communication serves to transform the subjective statements of the author into certified, objective information, and is, in the field of science, the mechanism behind the transition from 'subjective' to 'objective' knowledge as described by Popper (1972).
8. More or less: i.e., on the same machine and excluding typing errors and deviations in page layout.
9. Before the typewriter, printed texts were of course based on handwritten originals.
10. For instance, various contributors to Guntjahr 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.
11. Jerome McGann even argues that print's material (as opposed to handwriting's bodily) contingencies open up 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.
12. Writing tools do exist that purport to free the author from such concerns. These mark-up languages such as TEX, LATEX and SGML are based on the concept of intentionality rather than control, e.g., the writer merely indicates the intention that a textual element should be a heading or should be emphasized. The 'program' then applies typographical rules to create the intended layout and typographical characteristics. Lyx (see 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.
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 of connecting each letter since each handwriting style is slightly different.
14. See <http://pi.parascript.com/piweb/products/ritescript/rscr_prodinfo.asp>. The idea is similar to speech recognition systems. What is interesting is that the computer will understand a person's speech or handwriting, with the sole intent of transforming it immediately into computer code. 'For that's the stuff electronic texts are made of' (Kirschenbaum 2001).
15. This is what Weaver describes as the technical problem: the accuracy with which 'symbols of communication' can be transmitted, as distinct from the semantic problem related to the extent to which a message is correctly understood by the recipient (Weaver 1949).
16. 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 of documentary communication.
17. Although even printed texts 'do not stay themselves', as Matthew Kirschenbaum argues, electronic information 'has a natural inclination to change, to grow and finally to disappear' (Kirschenbaum 2001).
18. For this is another reason for the power of the publisher, especially in scientific publishing: the publication (i.e., the copy rather than the original) obtains its authority from the fact that it is certified by the

scientific 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 Michael Day 2001; 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). **19.** This explains why publishers prefer secure formats such as PDF above HTML. **20.** This form of contextualization is becoming increasingly important in the digital environment. It relates to an aspect of 'collective identity' that is not specific to digital media, but that is greatly facilitated within a digital environment, by means of 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 pro-

cess itself, culminating in the emerging concept of e-science (see De Roure et al. 2003).

21. 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 it. 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. **22.** 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.

Works cited

- Aarseth, Espen J. *Cybertext: Perspectives on Ergodic Literature*. Baltimore: Johns Hopkins University Press, 1997.
- Arms, William Y. 'Quality Control in Scholarly Publishing on the Web: What Are the Alternatives to Peer Review?', in: *Journal of Electronic Publishing* 8, 2002. Available at: <<http://www.press.umich.edu/jep/08-01/arms.html>>
- Birkerts, S. *The Gutenberg Elegies: The Fate of Reading in an Electronic Age*. Boston: Faber & Faber, 1994.
- Day, Michael. 'E-print Services and Long-term Access to the Record of Scholarly and Scientific Research', in: *Ariadne* 28 (June 2001). Available at: <<http://www.ariadne.ac.uk/issue28/metadata/>>
- Day, Ronald E. *The Modern Invention of Information: Discourse, History, and Power*. Carbondale: Southern Illinois University Press, 2001.
- De Roure, David, Nicholas R. Jennings, and Nigel R. Shadbolt. *The Semantic Grid: A Future E-Science Infrastructure*. 2003. Available at: <<http://www.semanticgrid.org/documents/semgrid-journal/semgrid-journal.pdf>>
- Duff, A.S. 'Daniel Bell's Theory of the Information Society', in: *Journal of Information Science* 24, 373-393, 1998.
- Febvre, Lucien and Henri-Jean Martin. *L'apparition du livre*. Paris: Michel, 1958.
- Ferris, Sharmila Pixy. 'Writing Electronically: The Effects of Computers on Traditional Writing', in: *Journal of Electronic Publishing* 8, 2002. Available at: <<http://www.press.umich.edu/jep/08-01/ferris.html#>>
- Gross, Alan G., Joseph E. Harmon, and Michael Reidy. *Communicating Science: The Scientific Article from the 17th century to the Present*. Oxford: Oxford University Press, 2002.

- Guntjahr P.C. and M.L. Benton, *Illuminating Letters: Typography and Literary Interpretation*. Amhurst: University of Massachusetts Press, 2001.
- Harnad, Steven. 'Implementing peer review on the net: scientific quality control in scholarly electronic journals'. 1996. 103-108. Available at: <<http://cogprints.ecs.soton.ac.uk/archive/00001692/00/harnad96.peer.review.html>>
- Harnad, Steven. 'The subversive proposal'. 1995. Available at: <<http://www.arl.org/scomm/subversive/sub01.html>>
- Kirschenbaum, Matthew. 'Materiality and Matter and Stuff: What Electronic Texts are Made Of', in: *Riposte*, 12, 2001. Available at: <<http://www.altx.com/ebr/riposte/rip12/rip12kir.htm>>.
- Kling, R. and G. McGim. 'Scholarly Communication and the Continuum of Electronic Publishing', in: *Journal of the American Society for Information Science* 50, 890-906, 1999.
- Levy, David M. 'The Universe is Expanding: Reflections on the Social (and Cosmic) Significance of Documents in a Digital Age', in: *Bulletin of the American Society for Information Science*, 25, 4, 17-20, 1999.
- Mackenzie Owen, J.S. and J. van Halm. *Innovation in the Information Chain: The Effects of Technological Development on the Provision of Scientific and Technical Information*. London and New York: Routledge, 1989.
- Mackenzie Owen, J.S. *Scientific Communication and the Electronic Journal*. Forthcoming.
- McGann, Jerome. *The Textual Condition*. Princeton: Princeton University Press, 1991.
- Nentwich, Michael. 'Quality Filters in Electronic Publishing' in: *Journal of Electronic Publishing* 5, 1999. Available at: <<http://www.press.umich.edu/jep/05-01/nentwich.html>>.
- Olson, D.R. *The World on Paper: The Conceptual and Cognitive Implications of Writing and Reading*. Cambridge University Press, 1994.
- Ong, Walter J. *Orality and Literacy: The Technologizing of the Word*. London: Methuen, 1982.
- Popper, Karl R. *Objective Knowledge: An Evolutionary Approach*. Oxford: Clarendon Press, 1972.
- Reddy, Michael J. 'The Conduit Metaphor: A Case of Frame Conflict in our Language About Language', in: Andrew Ortony (ed.), *Metaphor and Thought*, 284-297. Cambridge: Cambridge University Press, 1993.
- Roberts, R.J. 'Scholarly Publishing, Peer Review and the Internet', in: *First Monday* 4, 1999. Available at: <http://www.firstmonday.dk/issues/issue4_4/proberts/index.html>.
- Rockwell, Geoffrey and Lynne Siemens. *The Credibility of Electronic Publishing: Report on Responses to the Questionnaire*. 2000. Available at: <<http://web.mala.bc.ca/hssf/final/questionnaireR.htm>>.
- Rowland, F. 'Print Journals: Fit for the Future'. *Ariadne*. January 1997. Available at: <<http://www.ukoln.ac.uk/ariadne/issue7/fytton/>>.
- Rusch-Feja, Diann. 'The Open Archives Initiative and the OAI Protocol for Metadata Harvesting: Rapidly Forming a New Tier in the Scholarly Communication Infrastructure', in: *Learned Publishing*, 15 (July 2002): 179-186.
- Svedjedal, Johan. *The Literary Web: Literature and Publishing in the Age of Digital Production – a Study in the Sociology of Literature*. Acta Bibliothecæ Regiæ Stockholmiensis. Stockholm: Kungl. Biblioteket, 2000.
- Thiel, Sh. 'The Online Newspaper: A Postmodern Medium', in: *Journal of Electronic Publishing* 4, 1998. Available at: <<http://www.press.umich.edu/jep/04-01/thiel.html>>.
- Thompson, John B. *The Media and Modernity: A Social Theory of the Media*. Cambridge: Polity Press, 1995.
- Wagner, T. and S. Graham. *Efficient Self-Versioning Documents*. 1997. Available at: <<http://citeseer.nj.nec.com/wagner97efficient.html>>.
- Weaver, W. 'Recent contributions to the mathematical theory of communication', in: Shannon, C.E., and Weaver, W. *The mathematical theory of communication*. University of Illinois Press, Chapters 1.2, 4-6, 1949.
- Weller, A.C. 'Editorial Peer Review for Electronic Journals: Current Issues and Emerging Models', in: *Journal of the American Society for Information Science*. 51, 1328-1333, 2000.