

The ‘shadow of the format’ and other representational effects on research substance in the age of cyberscience

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Abstract:

Knowledge creation and hence possibly the outcome of research is affected in many ways by the increasing use of information and communication technologies (ICT) in science and research. We can distinguish three main routes of this impact: via changes in the methodology (e.g. distributed computing); via changes of the work modes (e.g. distant collaboration); and finally via representational changes. This paper focuses on the latter.

Representing scientific knowledge in databases, multimedia, hypertext or, more generally, in digital publications is not neutral with respect to the knowledge contained. Although formally stepping in only at the end of the research process, the new media will have effects with regard to the process of knowledge production. This paper distinguishes between anticipatory (that is author-related) effects and those at the receiving end (that is reader-related). In the first group we discuss the following possible effects for the substance of research: (i) what may be called ‘the shadow of the format’, that is a direct anticipatory effect on knowledge production given a previous choice of the later medium for publication; (ii) standardisation on the level of fixed hypertext modules and meta-data; and (iii) ‘preliminarity’ of the content, given the potential to constantly update. In the group of reader-related effects we count: (iv) hypertext reading; (v) enhancing transparency (e.g. of references); and finally, (vi) connectivity or interconnectedness of the research in the digital world.

The paper concludes that indeed, changes in knowledge representation potentially have a considerable influence on the substance of research.

1 Introduction*

At the beginning of the 21st century, there can be no doubt that researchers in almost all disciplines work quite differently than only some twenty years ago (Nentwich 2003). In most academic offices, the computer has replaced the typewriter, the phone rings less often than the E-mail programme reports new messages in the inbox folder and many of us have got acquainted with the pleasures and woes of retrieving information through the Internet. This list of obvious changes could be extended easily, but the question I want to approach here is whether these have the potential to influence the content of the research. In other words, does the application of ICT in academia affect *what* actually comes out of the activity of researchers as opposed to *how* it is done?

There is not much in the literature trying to directly address this question yet. Some authors seem aware of the issue, but rather focus on different aspects. On a general level, it has been argued that “all remembering occurs in a given context. And this context fundamentally alters the content of what is remembered” (Brown 1999). Speaking of hypertext and computer writing, Birkerts (1997, 213) notes that a change in the work modes necessarily impacts on the results, at least in a weak form. Translated to our subject here, ICT and in particular web archives, E-mail digests, groupware shared space and the like will impact on what researchers actually process and hence on what grounds the results are based. The Internet may be seen as contributing to a growing together of different, previously independent intellectual traditions and hence to new solutions (cf. Starbuck 1999, 190). Fuller acknowledges “technology’s potential to shape thought” (1998, 128). Some argue that the impact of the new forms of scientific work organisation (multi-site work teams etc.) is not yet clear, but it is implied that increasing sub-field fragmentation may indeed have an impact (Walsh/Roselle 1999, 57). Others argue that “(i)n principle, paper and electronic media need not influence the scholarly quality of a book or journal. But paper and electronic media do have significantly different material properties, and that influences some of their social properties.” (Kling/Covi 1995) A number of interesting points about the impact of the computer and the networks on intellectual and scientific work are raised in a short paper by Geser (1996). He distinguishes between self-related, interpersonal and institutional sources of intellectual work and discusses briefly ICT-induced changes for all of these sources. By contrast, the still ongoing projects of

* This paper is a condensed and partly enhanced version of section 10.4 of Nentwich (2003).

Berkowitz (2004) and Vasileiadou (2002) intend to elaborate more systematically and in extended form on the impact of the new medium on the content of research.

I distinguish between three main groups of consequences of ICT on the substance of research (Nentwich 2001; 2003, 60ff., 439ff.), namely those effects which are due to ICT-related changes in methodology (e.g. distributed computing, cf. Nentwich 2004), due to changes in work modes (e.g. distant collaboration), and finally due to changes on the level of knowledge representation. This paper focuses on the latter.

The question asked here is difficult to tackle from a methodological point of view. How to compare unique scientific results either achieved in a traditional or a cyber-setting with the output of a hypothetical project of the opposite formation? There is no direct way to get empirical data on this since it is impossible to carry out a research project in two parallel experiments with the same persons (it would be essential to have the same researchers performing in two different ways because the impact of individuality seems very important in research). Therefore, we are bound to ask researchers about their experiences and analyse the likely impact of the technology by comparing previous and current research while respecting the impossibility of direct comparison. This paper draws on 50 interviews with researchers from 13 academic fields, both in the humanities, social and natural sciences.

The impact of how scientific knowledge is presented on the content of research has a number of different aspects. On the one hand, there are novel formats which may have anticipatory effects on the process of writing (section 2), on the other hand, the end product has some characteristics which may influence how further research will be built upon (see section 3).

2 Anticipatory effects

2.1 *The shadow of the format*

How scholars communicate their research is changing. So far most E-publishing still somehow duplicates what has already been done for centuries in print and uses the Internet as a new distribution mechanism rather than as a new medium. But we can already observe novel formats of representing knowledge (e.g. experiments with hypertext and databases). For the sake of the argument, I shall presume here that in the long run, the digital world will be perceived as a new medium instead of a delivery channel. The question I would like to raise then is whether this development will impact on knowledge and thinking. In other words: When does form impact on substance?

Based on McLuhan's seminal works on general media theory (McLuhan 1962; 1964) and his followers, a number of thinkers started to apply his main ideas in our context. For instance, it has been argued that "the nature of the final product sets the parameters of the preceding stages of research" and hence, knowing what a hypermedia environment instead of a traditional book allows "will have (...) implications for how the object of study is conceived. In particular, we can postulate that a more deterritorialised and multi-layered field of meaning can emerge as the object of study." (Dicks/Mason 1998, 5.8) Obviously, the textual basis of computer conferencing "fosters the reflective and analytical cognitive skills associated with the task of expressing ideas in written form" (Gresham 1994, 48). Similarly, Ingraham (2000) argues that once the academic community has acquired the expertise to use the digital media, this will have significant implications for the way in which scholarly arguments are constructed. Writing about the future of the universities, Dator points at "the fact that what we think we understand about the world is entirely dependent on the models and media we use to perceive and reconstruct the world. (...) exploring the relationship between what we think with and what we think about" (1998, 617). The literature scholar Mueller (2000, 6) predicts that "the scholar's role may hover in interesting ways between author, editor, and curator". The author may no longer want to be bound by a principle of selection that favours his/her story and "may want the archive to be capacious enough to support other stories" (ibid.). According to Guedon, E-publishing can be compared to making a film out of a novel. He argues that this "generates effects that go well beyond the simple translation of a text into images" (1994, 2). Likewise, moving text from print to a digitised medium "transforms its functionalities, the way we relate to it, and the way it is distributed and received" (ibid.). Therefore, E-publishing brings about "a distinction between the access to information and the way readers relate to it" which leads to the conclusion that, "(a)ccording to our needs, we materialize the electronic information differently and we search it or study it or recycle it in other documents differently." (ibid.)

Hypertexts and hypermedia presentations would make a huge difference. They are not only a novel form of presenting results – they are digital, fluid, modular, multi-channel (Nentwich 2003, 278 ff.) – but the making of hypertexts may also influence the type of results to put into the "text". Modularity may force the author(s) to concentrate and focus more, to present the linkage and differences to previous research and value added of present research. Note that the changing medium may have consequences for both writing and reading. The form of the final product may not only influence the author's thinking (reflexive effect), but may also trigger different thinking on the *receiving* end, i.e. the reader (forward effect; see below 3.1).

Although the technological dynamics are likely to influence all functions of scientific communication, it can nevertheless lead to a “new architecture of scientific communication, provided this architecture is accepted by the scientific community” (Kircz/Roosendaal 1996, 4). This new architecture is something qualitatively important: “The emerging electronic tools already heavily influence the way scientists think and represent their thinking and research results.” (ibid., 7) The form of scientific communication seems to be an important ingredient in the development of science itself with the consequence “that changing representations will indeed induce completely novel science” (Kircz 1998, 1 and 9).

In particular, the possibility of conveying knowledge via non-text, i.e. multimedia or simulations or virtual reality, bears unheard of new opportunities. The author of the future might be

“able to simulate the various analog types of perceptions in electronic (binary) form, [while] the reader of the transmitted message can compare his/her own experience of the same sensory experiences, with the interpretation of the originator. (...) (E)lectronic publishing seen this way exten[ds] the capability to preserve the integrity of completely different kinds of information over multiple copies independent of time and place. (...) With the integration of analog information into the communications, analog information which will be the same for author (originator) and reader (consumer), scientific discourse will deepen and change.” (ibid., 5)

In a hypermedia environment, academic interpretation can take advantage of different media. For instance, moving images can be more than a complement to the printed word, but can also communicate content in a different way (Dicks/Mason 1998, 3.8). In such an environment, it would, for instance, be possible “to destabilise this assertion of authority of the image by creatively juxtaposing particular video clips with other narratives in the form of printed text, spoken text and other images” (ibid., 3.9). New meanings can emerge if the authors carefully mount different kinds of ‘data’, represented in different media (ibid., 3.10).

In a nutshell, the shadow of the future (the intended end product) influences the production. Having in mind as the final product, e.g. a (possibly online) database (instead of a thick encyclopaedic volume) or a multimedia hypertext (instead of a linear “paper”), should influence not only *how* a researcher works, but also *what* s/he works. Thinking in units of information and possible queries as well as of apprehension of multimedia elements is probably different than writing for a more narrative medium.

In addition, there may be research fields in which we would not only have to speak of a pre-effect, but of a complete change of methodology. If hypermedia is used as a new form of knowledge representation one may expect that (data) analysis and presentation happen in the

same medium (Dicks/Mason 1998, 5.2). In ethnography, for instance, one can distinguish between the cross-referencing approach to data analysis and the strategy of indexing. The cross-referencing approach avoids de-contextualisation and subsequent re-contextualisation of data which “potentially allows for a more embedded and holistic analytic approach” (ibid., 5.5). A study which compared a traditional book-like approach to ethnography with a novel hypermedia approach suggested “that there may be consequences for how theoretical models are conceived once their graphical representation is no longer confined to a single-medium”. This is not to say “that there are epistemological consequences per se, since to do so would be to posit a strong form of determinism whereby thought is defined by and confined to the conventions of particular representations.” Quite to the opposite, “since the human mind is clearly capable of making multiple linkages and connections, and since the social world itself requires flexible and multi-faceted analysis, then the creative integration of different media may offer the reader and analyst a more adequate approximation of the richness of (...) knowledge.” (ibid., 6.5) Also the political scientists Kulchitsky/Lavoie argue that hypertext systems for case study research (2000) may bring about new, previously not possible results.

In some respects, this perspective is not without problems. For instance, the visualisation of results may make recipients credulously believe the results and the methodology (Coy 1999). Computer-based methods would not yet be enough challenged and analysed, which would lead to a creeping devaluation of the discourse about methods. Furthermore, while multimedia elements may improve absorption of the knowledge, it may as well have a negative effect on knowledge production. Multimedia is costly, good multimedia even more so, not only in terms of money to be paid to specialists and for sophisticated software, but also in terms of time spent by the individual researcher designing and arranging the novel publication. The individual researcher might soon be in a position in which s/he feels almost obliged to “enhance” the publication, i.e. to add multimedia, because everyone does it. A similar phenomenon can already be observed in relation to the increasing sophistication of formatting papers before releasing them to the public. One could argue then, that this might lead to proportionally more time spent on form than on content.

In any case, it seems too early to draw any definitive conclusions on this issue. It seems nevertheless safe to venture the prediction that there will be “not a simple reproduction of a given pattern in a new medium while people get used to that medium” (Hert 1997, 332). As scholars have only started to get acquainted with the new medium, this stage has certainly not been reached yet. This expectation was matched by my interviewees. When presented with the statement “Bearing in mind, in what format academic knowledge will be presented after

the research is completed, already influences the production of the knowledge itself.”, the majority agreed. While only the physicists and mathematicians do not see any direct connection between knowledge presentation and production and not all economists, biologists and anthropologists would agree, all others believe in this pre-effect. However, while there was agreement in principle, it turned out that the interviewees had only limited or no experience with novel publication formats. Hence, their answers were speculative. In particular the experts professionally studying language were certain that focus and presentation determine content. Those from the natural sciences tended to sustain that form does not play an important role anyway and that arguing and persuasion with what ever means is less important and hence what counts is the result proper (the “substance” in my terminology). However, even in the case of biology “illustrative experiments” are known which are only done with a view to producing a picture for the publication although the result is already known.

In conclusion we may say that although there is only very limited evidence yet, my initial hypothesis may hold in the future. It seems very likely that the novel E-publication formats (hypertext, multimedia, database publishing) would lead to anticipatory or pre-effects in the realm of knowledge production. In a trivial sense, this is no news as it certainly “somehow” influences every author whether s/he is writing a short research article for a high-standing journal or rather a chapter in a book. This impact mainly relates to form. However, what I tried to show here goes well beyond this trivial meaning and postulates that indeed different substance may be produced if we start writing for a completely new medium.

2.2 Standardisation

Another type of pre-effect of the sort of knowledge representation envisaged is standardisation of some aspects of the academic output. How academic results are published is already highly standardised in the world of print. Think of the various types of scholarly writings, of the formal aspects and of the, in some disciplines, rigorous standards relating to the structure of a scientific article. In the digital age, the fact that the documents are shared and stored in electronic format adds a new route for specific standardisation. We may distinguish (1) hypertext effects, (2) meta-data standardisation and (3) building block standardisation.

(1) As to the option of hypertext instead of linear text, there are scenarios in which it is quite likely that the various hypertexts of a (sub-)discipline would grow together, would be interconnected, thus leading, in the long run, to a sort of knowledge web or knowledge base

(Nentwich 2003, 270ff.). In these scenarios, the likely consequence seems manifest that “the fact that information can be distributed in identical form and independent of time and place forces strong needs for tools and methods to compare the various aspects of the material, hence drives to standardization” (Kircz 1998, 3). Such an elaborated structure which subdivides the article into a number of constituent parts such as sections describing the experimental setting, the data, the methodology, the results etc. has already been proposed (Harmsze 2000). Also the links between the modules (or nodes) are standardised and hence articles in this format will be comparable and can be easily connected.

(2) Meta-data, i.e. machine-readable meta-information about a document, such as name of author, keywords etc., for instance are the subject of intensive standardisation (e.g. Dublin Core). Furthermore, XML, the emerging new (meta-)standard of “tagging”, i.e. technically structuring documents for the web, will inevitably lead to standardisation. Only if the relevant documents in a sub-discipline use the same set of XML tags, i.e. the same XML idiom, then the true potential of this powerful new tool can be fully explored. There are already a number of discipline-specific XML dialects, from MathML to ThML (for theology). Others explore the possibility of structuring written electronic discourse over the net by proposing a discourse mark-up language (DML, Rost 1996).

Furthermore, in an electronic environment, an author wants to be “found” by potential readers. Therefore, specific wordings and phrases (catch words) are more likely to be used with a view to showing up in the results of full text searches, and keywords included in field-specific thesauri are attributed, perhaps even though they may not perfectly suit.

(3) A specific kind of standardisation (“self-plagiarism”) is likely to emerge in the digital authoring environment where authors have access to their own publication archive. By re-using the same formulations or text components (building blocks) on different occasions (in different articles), authors “standardize and routinize verbal expression habits or explicit thought structures” (Geser 1996, 4).

In sum, while the “building block” standardisation is implicit, both the trend towards meta-tagging and mark-up and the possible shift to novel E-publishing formats requires some explicit standardisation. This is not to say that there will be an impact on substance in each and every case. However, the alignment with these standards may have effects on how to structure a text, how to express an argument and what keywords (or catch words) to use. Anticipatory effects on later phases of academic knowledge production are to be expected.

2.3 Preliminarity

There is yet another pre-effect of the digital format of academic publications. In contrast to their printed counterparts, E-publications allow, in principle, for constant update – as opposed to the qualitatively different “versioning” in the printed world whereby further editions of books take a long time and slightly revised versions of articles under different names are rather due to the current “publish or perish” culture than to any content-related necessities. In the online world, there may be subsequent versions of the same document, and comments or addenda may be directly linked to the original (Nentwich 2003, 280ff.). This possibility in principle may trigger a new culture of what could be called “preliminarity” with potentially both positive and negative effects.

On the positive side we may list that feedback and reactions can be taken into account by the author. In contrast to the printed world, an author who was convinced after publication that some of the arguments or data in the paper are erroneous may be given the opportunity to rectify the mistakes. Furthermore, even without initial errors, a paper may become incomplete if not obsolete through subsequent research. In particular authors of articles loaded with up-to-date empirical evidence and authors of state-of-the-art survey articles (and their readers) may be happy to have the chance to keep it up-to-date.

On the negative side, one needs to hold that knowledge stability is potentially in danger. If there is always a chance to rectify and amend a result even after publication, there is less incentive to make the piece “water-tight” in the first place. The WWW can be said to produce intrajective, provisional and partial meaning (Wildman 1998, 628). It may become a habit to publish only interim results and never final results. In addition, if different versions of the same text are in circulation (and quoted), this could easily lead to less clarity and even chaos. Institutionalised mechanism will have to be developed to solve this uncertainty (for instance, allowing it only for working papers, but not for published articles).

All but a few of my experts interviewed in biology, history, economics and physics believe that there is a tendency towards preliminary publishing, i.e. continuous updating of E-publications. Some not only expected a reinforcement of this trend, but even explicitly approved it, for instance, because it makes transparent the implicit preliminary nature of all research. Unanimously, the desirability of this is disputed. Version control and strict rules for updating are demanded. Those who do not see the future of academic publishing in terms of preliminarity either argue that the scientific community will curb it (i.e. establish restrictive rules) or believe that researchers have an incentive to terminate papers (i.e. not to work on them indefinitely because they want to start new things). In the mind of some, continuous

updating would not be “serious science”. Others see it as a positive incentive and feel a pressure to keep their web sites up-to-date.

I conclude that the novel opportunities of updating publications in the digital world are both a virtue and a vice. The possible negative effects will have to be counter-balanced by the establishment of new rules. However, as all scientific results are intrinsically preliminary, the digital medium also opens up new ways of coping with this transitory nature. It seems likely that this will have an impact on knowledge production itself.

3 Impact on the receiving end

While we have so far addressed potential anticipatory effects of the representation medium on knowledge production, there is the opposite route as well: different presentation may also influence further research.

3.1 Hypertext reading effects

Reading hypertexts is a largely different experience than reading linear texts. It has been argued (cf. Nentwich 2003, 297ff.) that hypertext may better match traditional reading habits (which are not as “linear” in practice as non-academics may expect); that it furthers more direct access to information units; that the serendipity effect – finding unrelated but relevant information “by chance” while browsing open stack libraries – is even enhanced in large hypertext databases; and finally, that in very large (not yet realised) hyperbase structures a new kind of (reader-driven as opposed to author-pre-structured) reading is favoured (Wingert 1996, 118). Some even speak of an epistemic empowerment of the reader (van den Hoven 1999, 345). While there will be certainly still similarities of reading in the linear and hypertext worlds, reading in a hyper-medium will be much more “active” than in the print medium, as there are more choices. Speaking of multimedia, a related argument can be put forward. In some fields of mathematics, for instance, the results are visualised and hence illustratively and vividly presented, thus contributing to a more immediate and perhaps deeper understanding. Virtual reality may contribute in the future to a different perception.

In sum, hypermedia may not only have a reflexive effect for the authors (while writing), but also a forward effect on the readers (while reading). Understanding and reception are mediated by the type of knowledge representation. This, in turn, is likely to impact on the subsequent thinking and knowledge production of the reader.

3.2 Transparency

Disclosure of data and supporting or non-supporting material may be standard and to some extent also legitimate in particular circumstances, for instance in highly competitive fields and in fields which are quite close to economic application. However, the main driving force of the overall collaborative endeavour “academic research” is openness and sharing of results – science may be understood as an open source project (DiBona et al. 1999). Cyberscience may be in a position to further transparency. This has three aspects:

(1) Because of obvious restrictions of “real” space in traditional print media, the empirical data and other sources (the so-called primary information) only rarely form part of the published research results. In many cases, it may however be of great interest to have a direct look at this information as it forms the basis of the research. This could easily be done in an electronic environment through “embedded citing” – the incorporation of quotes in their original contexts or of dynamic data – and “hypertextured documentation” – links to the data and related documents or to the software used. The vision is that the technology will enable mutual testing, replication, experimentation and verification of research results among scholars, not least in the social sciences.

A number of voices in the literature sustain this hypothesis (Davenport/Cronin 1990; Kircz/Roosendaal 1996, 8; Burg et al. 2000, 7; St. Laurent 1992). When confronted with the idea that transparency might be enhanced in the digital age, my interviewees’ assessments differed according to discipline. I come to the conclusion that, as disclosure of information is also part of the disciplinary culture in some fields and as there is not much experience with E-publishing yet, it may well be that this transparency effect will only occur in the longer run.

(2) Furthermore, transparency vis-à-vis (or: visibility for) the extra-academic world touches upon the wider issue of the relationship between science and the public since the Internet is creating a new interface between these two “worlds” (thus enabling transdisciplinarity). It is not unlikely that scholars are already or will be very soon aware of this new interface. Awareness of another potential public outside the scientific community may change the way the results are presented and worded and may eventually feed back on the type of research being conducted in the first place.

(3) Another argument in this context is related to the idea that the Internet has a potentially “democratising” or innovative effect on science and research. It may be that the more convenient publishing opportunities (easier access to peers) may give greater incentives to non-mainstream scholars to actually pursue their line of research because they have now a

bigger chance to gaining publicity than before (when they had to fear that their research would never pass the refereeing gates of the relevant publication outlets).

In all three cases, both a pre-effect for the knowledge production – the authors know that what they are producing is more transparent – and an impact on subsequent research – the readers may get a deeper and more informed understanding of previous (including non-mainstream) research on which to build their own work.

3.3 Connectivity

Closely related to the former issue (transparency) is a possible further consequence of publishing in the digital medium. I define “connectivity” of research as the fact that one piece of research has a good enough “interface” towards the rest of the relevant research, in other words that it fits well and is related to and embedded in the cumulative knowledge of a discipline. In this sense connectivity makes research accessible and useful for related (parallel or subsequent) scholarly work. Connectivity may be enhanced in an electronic environment. Three interrelated effects may be distinguished:

First, the quoting of sources becomes easier due to easy access to almost everything written about a subject and hence aggregated footnotes may become widespread. This effect is to be expected the more “additive” or “cumulative” a discipline’s way of accumulating knowledge is. This also means that parts of old works can be easily integrated into new works. This could lead to a period of “general information re-evaluation” (Kircz 1998, 2f.).

Second, having primary and secondary sources at your fingertips instead of having to go to the library and copy or excerpt each and every piece before you can work with it, may enhance the likelihood of quoting more sources. By the same token, this is likely to make your work more embedded in the work of colleagues, in particular by cross-hyper-linking. The results may become more “networked”.

Third, scholars’ work may be better suited to reach the target group (Kling/Covi 1995). While one possible emerging target group may be scholars from other disciplines interested in inter/transdisciplinary work, it is, however, also conceivable that this might as well lead to fragmentation: specialists working in their sub-sub-specialities might become unable to speak to outsiders and hence unable to communicate their knowledge in a “connectable” manner. By the same token, this might further “school” building, i.e. the creation of circles of researchers interested in the same topic, applying the same methodology and tending to quote only members of this circle while ignoring others.

The majority of my interviewees expected an improvement of the connectivity of knowledge through the Internet. While acknowledging the potential, many interviewees, however, referred to a changed disciplinary culture as a precondition for more connectivity. One element of this change may relate to present time constraints of scholars. The availability of material to which one could connect alone is certainly not enough. As long as publication pressure and day-to-day working circumstance do not allow for more reading time, it may be difficult to realise the potential. I finally come to the conclusion that it is likely that the digital, “hypertextured” publishing and communication environment may, in the long run, lead to more connectivity of research.

4 Summary

So, does ICT influence thinking and analysis? The short answer is that it certainly does. I have gathered enough evidence and arguments to sustain a “yes”, in principle. The longer answer, however, is less simple. The use of ICT in academia only seldom directly influences thinking and analysis, but does so mainly indirectly by setting general parameters and different incentives, and by changing framework conditions for academic knowledge production. Furthermore, many of the potential effects are not yet visible, but may only appear in the longer run. Note that we have had only very short experience with the new media and they have even changed constantly along the path. For some potential impacts discussed above, it is simply too early to give a final assessment. However, there are strong hints that changes of knowledge representation will indeed impact on the substance of research. Among them are those presented in this paper:

I distinguish between anticipatory (that is author-related) effects and those at the receiving end (that is reader-related). In the first group, what I call the “shadow of the format” effect means that it seems very likely that the novel E-publication formats (hypertext, multimedia, database-publishing) would lead to anticipatory or pre-effects in the realm of knowledge production. Indeed, different substance may be produced if we start writing for a completely new medium. Furthermore, the trend towards meta-tagging and mark-up as well as the shift to novel E-publishing formats require some standardisation. The alignment with these standards will have effects on how to structure a text, how to express an argument and what keywords to use. In addition, as all scientific results are intrinsically preliminary, the digital medium opens up new ways of coping with this transitory nature. It seems likely that this will have an impact on knowledge production itself. Speaking of effects at the receiving end, we came to the conclusion that reading in the new environment is very different than in the old one.

Therefore, we expect that the new kinds of reception of previous research will influence further research. In addition, the transparency-enhancing effect of the new media have not only a pre-effect for knowledge production – the authors know that what they are producing is more transparent – but also an impact on subsequent research – the readers may get a deeper and more informed understanding of previous (including non-mainstream) research on which to build their own work. Finally, there is a chance that the digital, “hypertextured” publishing and communication environment may, in the long run, lead to more connectivity of research. In other words, the pieces of research substance may have a better “interface” towards the rest of the relevant research and hence contribute to more cumulative knowledge production.

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