Digital objects as "transducers" in scientific web publishing

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Abstract:
Scientific web publishing offers an attractive bundle of phenomena for feminist technoscientific investigation. This article focuses on research articles in scientific journals and aims at identifying a range of exclusionary practices in the current publishing system, which need to be critically addressed. For this purpose, the functionalities of digital objects are studied using the analogy of a piezoelectric crystal as a transducer in obstetric ultrasonography [Karen Barad 2001]. This is embedded in the idea that scholarly communication, and publishing in particular, is characterized by an economy based on gift-giving-for-recognition.

Keywords:
Scholarly communication, research literature, scientific publishing, gift-giving, journals, file, metadata, digital object, digital object in context, doic, open access, Karen Barad, transducer, apparatus, boundary practices, feminist technoscience.

Introduction

In scientific web publishing, a manager's attention focuses on digital objects with issues such as how to attract the best output for one's brand, how to generate profit/finance the editing, marketing and maintenance, and so on. For feminist technoscience debates, when it comes to digital objects, what merits closer inspection are the practices that bring about a digital object's technoscientific context,[1] and the dynamics authors perceive in the face of publishing conditions. Such practices and dynamics

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[1] By 'technoscientific context' I mean all aspects that need to be considered if one wishes to analyse how a certain digital object got into the context where it is found. This includes the often invisible effects of exclusionary practices, an ensemble of critical issues which form one of the hallmarks of feminist technoscience. The concept of technoscience underlying my article is a shortened form of 'technoscience studies' and it derives from the work of Marion Mangelsdorf who suggests to consider three different layers: a descriptive-analytic level, a deconstructivist level, and a visionary level [Mangelsdorf et al. 2007]. It is from each of these levels separately or in common that feminist technoscientific studies can benefit, the visionary level (where boundaries are being questioned in a creative way) possibly being the most fruitful for the critical inquiry into a digital object's technoscientific context.

are interesting, because conditions are being introduced by editors and publishers, yet most authors feel that new knowledge is primarily intended for readers. While this may or may not be a disparity, publishing conditions very probably have a critical impact on the quality of the context in which a digital object is to be published. Generally speaking, studying technoscientific practices in research publishing is pertinent because the findings may contribute to a productive dialogue with members of the scientific community: What do researchers as readers ask for? And: how do researchers as authors actually intend to publish their work? [1.]

One of the organizing principles of scientific communication is gift-giving [Hagstrom 1965]. Items containing new insights for discussion are given away for free. However, no gift is a gift unless it is recognized. If recognition is bound up with visibility, a gift should be made visible so it has a chance of being recognized. In scientific communication, it is practices such as referencing, citing and discussion that have the function of giving recognition. So, one way of finding out what makes the context of a digital object, is to ask: which aspects constitute the technoscientific conditions that need to be met by a research contribution for it to be able to attract such practices of recognition in the first place? This links to the issue of how an author can recognize the best publishing context.[2] [2.]

The aim of this essay is to come up with a range of technoscientific phenomena in research publishing that usually seem to escape recognition. My source of inspiration is Karen Barad's 2001 article, which attempts to bridge discursive gaps between Science Studies and Queer Theory by analogy to the function of piezoelectric transducers in obstetric ultrasonography. In my contribution, I use the same analogy source, but I turn to scientific publishing as my analogy target, placing my focus on research articles in scientific journals.[3] [3.]

Firstly, I will detail some distinctive attributes of a digital object by offering a general description of a file and of metadata, and from here will I explain my definition of a "digital object". Secondly, I will address the characteristics of what I call a "digital object in context" (to be termed a "doic").[4] Here, gift-giving and recognition will re-enter the scene. Thirdly, I will show how the functionalities of a piezoelectric transducer [Karen Barad 2001] might be turned into a suitable analogy for a digital object, expanded by two items to be more suitable to the gift-giving parameter. Fourthly, I will address how certain phenomena created alongside the idea of a doic might link to Barad's notion of "apparatus" [Barad 2001, Barad 2003], which was developed out of a study of Niels Bohr's philosophy. This will serve to elucidate the epistemological implications of the analogy source. The overall argument of my paper is that ideas generated in feminist technoscience debates provide a useful perspective on current practices in research publishing. [4.]

I. Files, metadata, and digital objects

From the general point of view of a reader who is accessing the web, a digital object is a file. A file is a well-known entity: we have an idea about what such an item is usually like (what we expect it to be like). We probably recognize file formats, and may accordingly hope to open the documents using specific software tools. If all goes well, we can study them and learn something new. So, on a given website, a file is recognizable as a distinctive entity (usually given as a hyperlink). The boundary of

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[2]   *For recent views on internet gift economies, see Mark Fox, ed. 2005; for research articles as intellectual gifts in return for receiving the intellectual gifts of others, see Baird 2004:223; for a more detailed functional definition of scholarly communication (in the field of Physics), see Roosendaal et al. 1997.*

[3]   *This means that I am not considering review articles (although I agree with Judy Noguchi that review articles should be upgraded in value [Noguchi 2006:243]), nor am I considering scientific writing found in any other type of periodical publication, even though these may also be texts produced by researchers. I am merely considering the publishing dynamics for items which have a trade value in the distinctive academic social economy of gift-giving-for-recognition. In Mode 2 knowledge production, the combination of different genres, publics, and intersectional spheres would of course merit an analysis of its own.*

[4]   *A preview of this was presented at the EASST 2006 in Lausanne, "Digital objects in context", at Forum: Adressing the "unease" around the current publication system (2 – Roundtable), 24 August 2006, http://www2.unil.ch/easst2006/Prog%20Update%20180806.pdf (page 16) [last accessed 2007-03-19].*

such an entity is marked by a kind of packaging indicator made up of a file name, a boundary sign, and a file format abbreviation, all of which can most likely be identified by showing the following syntax:

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[n signs, with or without blank spaces][dot][three letters]
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Example: Letter-to-the-editors_2007-03-21.odt [5.]

In order to be recognized as such, a file is also dependent on its metadata set. Metadata are well-sorted pieces of information about other data. A typical metadata set for research articles will at the minimum include the title, the author(s), keywords, the location of the document (its source), and a relevant date. [6.]

One might argue that every file has metadata. This is certain.ly correct if we count the file format indicator among them, which is usually indicated by the last two items in the full name of the file (`[dot][three letters]`). If the file name is meaningful, the content of the first item of the syntax (`[n signs, with or without blank spaces]`) may also be an item to reappear among the file's metadata. If you check the file system of your software, you will find that some more metadata are automatically generated for each of your files, for instance: size, last modified, etc. [7.]

Considering metadata is useful not only for database specialists, but also for authors, because it helps realize the possibilities of a certain document. In my view of the matter, a set of metadata forms an integral part of a file.[5] Taking this position, why am I still separating the two entities of "file" and "metadata" here? While this is mainly for analytical purposes, it also has a practical dimension: Usually, authors and readers alike do not consciously pay attention to the metadata of a scientific document because they are trained to think that it is just the "contents" that matter. Since I think that this view might deprive an author of important insights, I am placing some emphasis on a differing opinion which holds that metadata are at the root of an article's visibility. Take as an example the tasks of an editorial team member, who is checking the congruency of the metadata and the author's file when asking: have the file's specificities been given an apt description in the metadata? For instance, is the implicit audience of the keywords congruent with the intended audience of the current publishing context? This means to say that without the relevant metadata, a file might risk not being traceable to its source, hence no reference can follow, and no recognition be given. [8.]

Distinguishing between "file" and "metadata" is also useful analytically even though, if we think in terms of data fields (see Chart 1 below), certain fields may contain exactly the same data both in the file and in the metadata. This needs a bit of explanation, but it will soon become evident. Take for instance a fauna museum's exhibit: the specimens of stuffed birds in the display case most likely mean very different things to occasional bird watchers and ornithologists, even though they may be looking at exactly the same object [Geoffrey C. Bowker/Susan Leigh Star 1999:297]. Now let us imagine we have two other exhibits, one being the file, and the other being the metadata. Both are being looked at by different types of "ornithologists". What attracts the author's attention, is the file. Some of the aspects found in the file may identically be found in the metadata exhibit – let's say both have "red wings". So, red wings can be found on both the file and the metadata. Yet, for the author it may be difficult to discern anything but the red wings in the metadata. Vice versa, the information scientist, who is the "ornithologist" for the metadata exhibit, finds the red wings interesting in the file, but nothing else. The arguments made in the text of the file might simply escape the metadata ornithologist, just as the xml coding of the metadata most likely escapes the author who, as the file ornithologist, sees nothing much more than the red wings of the metadata exhibit. But both groups of ornithologists see at least the red wings in both exhibits. These are the metadata fields. In comes the editorial team member, who is able to contextualize the red wings in both exhibits and to create meaningful field content to satisfy both the file and the metadata ornithologists. [9.]

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[5]   *For differing views on the usefulness of metadata vis-à-vis metatags see article on Metadata, paragraph on Criticisms, Wikipedia, the free encyclopedia, http://en.wikipedia.org/wiki/Metadata#Criticisms [last accessed: 2007-05-09]; for challenges to creating shareable metadata, see Sarah L. Shreeves et al. 2006; for interoperable fabrics in metadata exchange, see Van de Sompel et al. 2006.*

For someone in search of recognition, it is always good to know what others see, and from which perspective it is that the others are looking. This is why considering metadata fields can be interesting. Let us have a look at an arbitrary selection of useful metadata fields. The left column shows what kinds of "fields" a metadata specialist sees in a file, the right column gives an impression of what kind of metadata work can be performed on a research article. [10.]

Chart 1: Metadata fields

usually explicit in the file	No.	in the metadata
document source, maybe incl. the document's URL and/or DOI	1	document source, document ID (software's default)/DOI/URL/URN/persistent identifier
licence	2	licence
	3	if it is an open access document/ for-pay items go unmarked (as yet)
title of the article	4	title of the article
abstract	5	
keywords	6	keywords
author(s) of article	7	author(s) of article
affiliation	8	
contact data	9	
document version/date	10	document version/date
review status indicator (e.g., under review or ready-to-quote)	11	
	12	language
(a review is explicitly marked/ a research article goes unmarked)	13	
(implicit in field 1)	14	size in KB
(may be implicit marked in field 1)	15	file format
article text	16	
notes/references	17	references
acknowledgements (incl. where first presented, which article mainly an earlier version of this one)	18	
note on the author	19	

Some metadata fields are by convention already included in the file in almost all disciplines (see the positions 1, 4, 7, 16, 17, marked bold in the chart above). For these, we just need to make sure they do reappear correctly in the metadata set proper. However, field 16 (article text), will only be covered by full text search options; on the other hand, field 6 (keywords) may contain expressions which do not appear in the text at all (which is usually due to a helpful external perspective carried out). [11.]

Some more specific attention, however, should be given to metadata fields that serve to contextualize the research document as a digital object. For instance, take the common practice of producing a quick printout from the web ("Oh, this sounds like an interesting article, not quite what I was looking for, but let's have it all the same, then go on to ..."). What exactly should be found on the printed pages so the reader can give recognition? While this will certainly also remain a matter of agreement among the participants of a publishing enterprise, I suggest it be all the fields shown in Chart 1. [12.]

In order for my digital object to take its role within this specialist gift-giving organizing principle, I need to make sure that a context-sensitive assortment of metadata goes with my file when it is put onto the web. This serves to show that metadata are of equal importance with "content". By way of

summing up: what I am calling a "digital object" is made up of a file and its metadata. In a short simplification this reads as:

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file + metadata = digital object
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[13.]

II. The "digital object in context" (doic)

What is it that transforms a "digital object" into a "doic"? Some of the metadata fields outlined in Chart 1 above can only be filled with data when the actual publishing context has become clear. This shows that the aim of metadata is for them to be put to use, or rather, for them to document the practices carried out. For instance, if I am writing something to be placed on my homepage for free download, it is fairly easy to determine which URL the document is going to have because I will know immediately. If somebody else is to decide on the URL, it may take some more steps to know for sure what the URL will be. [14.]

There are in fact both temporal and functional aspects to the creation of metadata. The temporally bound metadata fields may be grouped in at least three stages: one set of fields can be completed at the time of finishing the document version for review, the second should be added on uploading the doic to the web for the public, the third stage is made up of metadata which document the recognition given (e.g., where the doic is being referred to, cited, or discussed). The third group may theoretically be infinite. In practice, it will depend on the more long term arrangements that are undertaken for the doic, e.g., having it archived on a national library's server. [15.]

The functional aspects are more independent from the temporal stages. However, they are not completely autonomous since, more likely than not, i.e., unless authors act as their own publishers, there are different people involved in the different stages of creating a doic. Such functional aspects may include the licensing (a licence says what others may or may not do with a digital object). This may be subject to change as the culture of licensing digital objects is changing rapidly.[6] [16.]

In short, a doic is different from a digital object by the quality of the practices documented in the different stages of "metadating". Hence we might say that a doic is a derivative of a digital object:

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digital object + metadata in use, step 1 = doic + metadata in use, step 2 = doic
+ metadata in use, step n = ...
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[17.]

The general process I am discussing here might be illustrated by a rather simplified flow chart.[7]

Chart 2: From the file to the doic

file → metadata → digital object → doic

As indicated above, publishing usually is a piece of intersectional work, since it is usually people of various following professional backgrounds who contribute in some way or another. Among these we find: authors, often with their friends and their colleagues; maybe translators; editors, maybe reviewers; editorial team members like publishing managers, programmers, copy editors, typesetters; database specialists/librarians; even customers, be they retailers, bookshops, institutions, or readers ... So, let us add a few more instance to the flow chart:

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6   *E.g., with Creative Commons Licenses showing a rise in acceptance also in the world of research, http://www.creativecommons.org, http://sciencecommons.org/ [last accessed 2007-03-19].*
7   *The flow charts are inspired by the ACP/ACPD journal editors' graphic charts which illustrate their new type of a parallel closed and open reviewing process, see Process of Peer-Review, Publication & Interactive Discussion http://www.copernicus.org/EGU/acp/publication_process.html [last accessed 2007-03-19].*

author → file → metadata → digital object → editorial team → doic → reader

Linking this to the specifically academic processes involved in gift-giving and recognition, where does the gift begin and end? [18.]

Chart 4 shows a traditional perception of the relation between the author and the gift: the author sees to the "contents" of a file but hesitates to look beyond.

Chart 4: Author – Gift – Recognition (I)

author → gift (file) → metadata → digital object → editorial team → doic → reader giving recognition

Arguments such as those voiced in this essay may be found in Chart 5: authors get more of a say for their articles if they consider metadata as being part of their gift.

Chart 5: Author – Gift – Recognition (II)

author → gift (file → metadata → digital object) → editorial team → doic → reader giving recognition

Chart 6: Author – Gift – Recognition (III)

author → gift (file → metadata → digital object → editorial team → doic) → reader giving recognition

Chart 6 indicates both a traditional and an emerging discursive culture of how publishing works: commercial publishing houses (traditional) as well as institutional repository services (emerging) claim that they perform relevant work between the author and the reader. The issues to be addressed include: how much work (and what type of work) is done on the gift, how much profit is made at whose cost and at whose gain, and what the characteristics of the resulting doic are in relation to the reader, who should be enabled to give recognition (which is the aim of the gift in the first place).[8] It is here that I wish to introduce Barad's piezoelectric transducer analogy to address the phenomena in publishing that I consider to be new and exciting. [19.]

III. The transducer analogy

A transducer in Barad's terms is, broadly speaking, a "device for making and bridging boundaries" [Barad 2001:109]. Barad's concept includes both the making and bridging of boundaries, and this is what makes it productive for my analogy target. Let me first explain what Barad's analogy source is, and then adapt it to the context under discussion here. [20.]

Barad gives the example of a piezoelectric crystal in obstetric ultrasonography to illustrate a transducer's functionalities. One of the sources of inspiration is the Foucaultian body under pressure [Barad 2001:98-99]. Barad is not studying pressures on the human body, but pressures on a crystal that is built into a medico-technical machine constructed for visualising what is hidden from human sight. The crystal, which in ultrasonography functions as a transducer, is a piezoelectric one: its structure is asymmetrical, usually trigonal. Quartz and Rochelle salt, for instance, show piezoelectric effects very well [Valerie Pitt, ed., 1977:284]. The ultrasonograph was devised to exploit two different effects bound to one another, called "the piezoelectric effect" and "the reverse piezoelectric effect" respectively. The first effect is created through impinging an ultrasonic wave (high-frequency, and non-electric) on the crystal. Here, the crystal functions as a receiver: the wave causes a compression of the crystal, which as a result issues an electric signal. Conversely, in what is called "the reverse piezoelectric effect", the crystal serves as a transmitter when an electric signal is applied.

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[8]   *Cf. European Commission, DG Research (2006)*

This causes both expansion and contraction along different axes of the crystal, and as a result, ultrasonic waves are issued. In these processes, sonogram images can be displayed on a computer screen [Barad 2001:100, 109]. It is the dual functionality of the transducer, with both effects being the two sides of the same coin, "that makes it the effect and instrument of visualizing technologies" [Barad 2001:98]. [21.]

An illustration of the analogy source in a simplified flow chart might look like this:

Chart 7: Transducers in ultrasonography (original analogy source)

foetus → ultrasonograph → piezoelectric crystal (as transducer) → computer screen (with sonogram images) → technician/physician/scientist/engineer (staff)

Let me expand the flow chart by two entities to make it fit the gift-giving parameter employed for my specific analogy target: in the analogy source, I suggest adding the pregnant mother at the beginning, and the act of interpreting/utilizing at the end:

Chart 8: Transducers in ultrasonography (enlarged analogy source)

mother→ foetus → ultrasonograph → transducer → sonograms → staff → utilization

Chart 3 again: From the author to the reader (analogy target)

author→ file → metadata → digital object → editorial team → doic → reader/recognition

Setting up the two flow charts like this, makes us draw analogies between (1) the mother and the author, (2) the foetus and the file, (3) the ultrasonograph with the metadata, (4) the transducer with the digital object, (5) the sonograms with the editorial team, (6) the staff with the doic, (7) the utilization with the reader's recognition. All of these would invite the creation of interesting new phenomena for analysing the research publishing system. Let me focus on pair no. 4, the transducer and the digital object. [22.]

Like ultrasonography, publishing, too, is a result of the utilization of visualizing technologies. Digital objects occupy a central position because it is precisely these entities that are attracting most attention. They are therefore being made visible.[9] If something is made visible, this can be said to be an effect of visualizing technologies. Likewise, digital objects are in a sense the instruments of the visualising technologies because it is through the interest value of these objects that the technologies are being developed in the first place. Digital objects therefore can be said to have a dual functionality, too. [23.]

In another perspective on the visualizing practices of the publishing process, we might look at them as both making and bridging boundaries. As I will show in the next paragraph, there are quite a few boundary practices to be discerned in the publishing process. Let me briefly discuss just one instance here: the by now familiar scene of a reader accessing a website in search for new food for thought. If the website shows some metadata about a file which might be of interest, this is in one sense a boundary-making practice ("here is something you do not yet know in detail"), but in another sense, it is bridging a boundary because some information is already given – and maybe this is more than what the reader knew before. The second step, too, may be seen in both ways. If there is a hyperlink to the document, this may be seen as a boundary-bridging act ("click here and you get to the full text"), but unless the file is open access, this hyperlinking may turn out to lead to a boundary-making practice, since not all who can click can get to opening the document. The third step might entail a software problem, and so forth. This serves to show that practices of making and bridging boundaries may be

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[9] *Usually, digital objects are made visible only after they have been transformed into doics, but for matters of brevity and of clarity, let me stick to equating the transducer with the digital object.*

the two sides of the same coin. For these practices surrounding the digital object as a transducing device, it is, last but not least, the circularity of the academic social economy of gift-giving-for-recognition that I take to account for many of the intricacies. These had not occurred to me before and Barad's analogy exercise has been fruitful for me particularly with regard to identifying dual functionalities on a more microscopic level than the gift-giving principle. [24.]

The analogy exercise makes into phenomena a number of aspects in the current publishing system. In the following I suggest looking at the range of such phenomena in more detail. With this we can now turn to the epistemological implications of the transducer. [25.]

IV. Emerging phenomena in apparatuses

A digital object's metadata quality is not only correlated to how the metadata are utilized, but also to how they are being interpreted. This opens up our view towards what I have termed emerging phenomena in apparatuses. [26.]

Barad, whose background is theoretical particle physics following Niels Bohr's philosophical work on quantum mechanics, defines "apparatuses" in the following way:

> *Apparatuses are not preexisting or fixed entities; they are themselves constituted through particular practices that are perpetually open to rearrangements, rearticulations, and other reworkings. [Barad 2001:107]*

> *Apparatuses are open-ended practices. Importantly, apparatuses are themselves phenomena. [Barad 2003:816]*

> *[A]pparatuses are dynamic (re)configurings of the world, specific agential practices/intra-actions/performances through which specific exclusionary boundaries are enacted. [Barad 2003:816]* [27.]

By defining apparatuses in this way, Barad mainly counteracts experimental scientific setups in which machines, and the humans who built them, are left out of the picture when it comes to interpreting results. As if such instruments were independent entities, and certain phenomena independent of these machines, devised and built to prove exactly the phenomena produced by such a setup – phenomena which might otherwise not "exist". Barad stresses that

> *[R]eality is sedimented out of the process of making the world intelligible through certain practices and not others. Therefore, we are not only responsible for the knowledge that we seek, but, in part, for what exists. [Barad 2001:109]* [28.]

If I understand this correctly, Barad holds that it is a choice of practices which forms an apparatus, and ongoing (re)configurings serve to show that apparatuses themselves are phenomena. From this I conclude that "what exists" can be described in terms of a dual functionality by which knowledge points in two directions at the same time: to the apparatuses as well as to the choice of practices by which the apparatus was formed (and is continually being re-formed). The practice of seeking knowledge is therefore also a choice by which a responsibility is enacted. This concerns how such practices are taken out, and which apparatuses are being created through this choice of practices (and not others). Consequently, I take Barad to say that practices may produce exclusions, and that whatever has this effect may be described as an apparatus. [29.]

Seen from this vantage point, we need to pose more comprehensive as well as more detailed questions when considering my analogy target of research publishing: which practices can be seen as being "certain practices and not others" through which "specific exclusionary boundaries are enacted"? And which exclusions are being produced by which practices? To give another instance, which are the "sonogram images" chosen and who interprets them by which type of scientometrics? [30.]

However, it is not only exclusionary practices that make up an apparatus. There may be enabling practices, and those with dual functionalities – as we have seen above with hyperlink examples for mutual boundary-making and boundary-bridging steps when accessing a file on the web. And, after all, knowledge seekers do find something when they create apparatuses through their choice of practices. And what they find might actually be a gift. Inspired by Barad's impressive list of mutually constituting practices surrounding the piezoelectric transducer (Barad 2001:108), I made up my own list to investigate newly emerging phenomena in the apparatuses of which digital objects are a part. [31.]

Before giving you my list of issues, let me quote a passage from my basket of gifts on scientific publishing that now – because of its limited rational choice outlook – serves to fuel very nicely what I wish to conclude my contribution with. It is from Yanfei Shi's 2002 study called "The Economics of Scientific Knowledge. A Rational Choice Institutionalist Theory of Science", and it reads:

> *Scientists act rationally by economizing on their limited capacity to acquire and process information and conforming their functional preferences to the constraints of scientific institutions, and then searching out and choosing the course of action that would satisfy those preferences. [Shi 2002:103]*

For contextualising this observation, let us return to the reader who is accessing the web, and finding a file indicated by a hyperlink. Which functional preferences might make for which course of action when accessing a file on the web? [32.]

Which layout, and which metadata, may account for which impact from a reader's perspective? Is it the identity of the author/the authors (presumed or actual), their name (be it an actual name or a pseudonym)? Is the person figuring with this name well known in this field, or rather outside of it? Maybe the author/among the author(s) is a close colleague/a personal acquaintance? Maybe a competitor? If an author/the name is unknown to me, are there connotations in this name which escape me, for instance cultural linkages like "someone with this family name was previously active in the field of ...", are these two relations? Is a short CV given? Is the institutional affiliation explicit? The country, the status of the country/of the institution in the respective field? What about the publishing context: the journal, the publisher/the country of its headquarters, the journal editor's name(s), the (presumed or actual) effects of branding on the standing of the journal in a field, other (presumed or actual) "quality" indicators? Are there buzzwords or other signals in the title that make this doic sound interesting? How and why does the reader recognize buzzwords – which discourse are these from and who dominates the respective discourse? What is the style of the article title: is it a short, factual one; or is it a playful two-line one with, e.g., a quote, a pun or a motto in the first line, and an explanatory function in the second line; etc.? What does the style of referencing indicate? What is the impact of "mistake"-free writing on the perception of "research quality"? Was the doic difficult to get to because of an unclear or incomplete reference, or because no easy web verification of the reference was possible (even though this may be complete)? Maybe the hyperlink works only to the extent that the reader gets to a new page asking for a payment? So, no access might be available because of subscription toll (maybe it needs some networking to get to the doic, e.g., asking an institutionally better-off colleague to send the document on – possibly by a breach of licences), or checking the author's website, or asking for a pre-print by mail. Are there any indicators that show explicitly that this doic is open to dialogue? For instance, are mail address(es) of the author(s) given, is there a link to a web space in which open reviewing is offered? Is a citation format given for this doic which advises how it should best be referenced? Is there an easy way of learning about who has been referencing this or earlier work by the same author(s)? (This aspect is gaining in importance as transdisciplinarity is becoming a more widespread practice, because it helps accommodate occasional participants or newcomers to a certain field or discourse, hence can be seen as an invitation factor, similar maybe to giving mail addresses of authors directly in the file.) And, last but not least, which differences are being covered up by convention, which differences are made visible and have become an integral part of the rules of the publishing game? For instance, why is the age of an author only rarely indicated in "note on the author(s)"? What about an author's mother tongue(s)? Conversely,

what is the aim of giving academic titles and professional position descriptions? [33.]

A microfocussing technoscientific perspective on the matter would continue by asking which of these dual boundaries are explicitly recognized by the reader as an author? And, most importantly, in which way do these boundary practices help an author form an appropriate decision on what to write about, how to present one's findings, where to place one's work? [34.]

Conclusion

The overall argument of my paper was that ideas generated in feminist technoscience debates provide a useful tool for critical perspectives on current practices in research publishing. I exemplified this by choosing Karen Barad's concepts of "transducer" and of "apparatus" for analysing complex technoscientific processes. The term "doic" was introduced to indicate that every digital object (which is itself made up of a file and its metadata) is determined to a large extent by ongoing metadating in its publishing context. By analogy to Barad's transducer, I illustrated how digital objects produced by research authors serve a dual function in the publishing system. Here, it was helpful to consider that the organising principle for research is gift-giving and recognition because it served to show what a research author's aim is in publishing in the first place: being recognized by others, who, in return for the gift, reference, cite and discuss one's work. Whatever the exclusionary practices may be within research publishing as an apparatus of open-ended practices, should be subject to criticism. I have shown that it is pertinent to consider feminist technoscience for infusing the general debate on the accessibility of the research literature with a range of new phenomena. [35.]

Note on the author

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