

Sociological implications of scientific publishing: Open access, science, society, democracy, and the digital divide

by Ulrich Herb

Abstract

Claims for open access are mostly underpinned with

- a. science-related arguments (open access accelerates scientific communication);
- b. financial arguments (open access relieves the serials crisis);
- c. social arguments (open access reduces the digital divide);
- d. democracy-related arguments (open access facilitates participation); and,
- e. socio-political arguments (open access levels disparities).

Using sociological concepts and notions, this article focuses strongly on Pierre Bourdieu's theory of (scientific) capital and its implications for the acceptance of open access, Michel Foucault's discourse analysis and the implications of open access for the concept of the digital divide. Bourdieu's theory of capital implies that the acceptance of open access depends on the logic of power and the accumulation of scientific capital. It does not depend on slogans derived from hagiographic self-perceptions of science (*e.g.*, the acceleration of scientific communication) and scientists (*e.g.*, their will to share their information freely). According to Bourdieu's theory, it is crucial for open access (and associated concepts like alternative impact metrics) to understand how scientists perceive its potential influence on existing processes of capital accumulation and how open access will affect their demand for status. Foucault's discourse analysis suggests that open access may intensify disparities, scientocentrism and ethnocentrism. Additionally, several concepts from the philosophy of sciences (Popper, Kuhn, Feyerabend) and their implicit connection to the concept of open access are described in this paper.

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The discrepancy between technical opportunities of instant and global access to digital scientific information and *de facto* restricted access to scientific information supports claims for open access. The only barrier to scientific information that is accepted by open access protagonists is the need to use the Internet as a technical infrastructure. By definition, open access documents reside electronically on the Internet and may be used by anyone without paying any fees. In this way, immediate access to scientific information, free of charge, is made possible. Following these arguments, it can be said that open access ensures accelerated scientific communication and fosters new scientific discoveries.

Financial justifications

Paying fees in order to access scientific documents annoys scientists as long as they are not rewarded for their contributions, *e.g.*, as authors or as peers reviewing papers of colleagues. Accordingly, the Budapest Open Access Initiative (BOAI) stated in 2002: "The literature that should be freely accessible online is that which scholars give to the world without expectation of payment." (BOAI, 2002) Subscription and licensing fees for scientific journals are considered access barriers, as universities and their libraries find it difficult to afford these fees in times of declining budgets and rising costs (U.K. House of Commons, 2004; Electronic Publishing Services (EPS), 2006). Thus, the case in favour of open access is

bolstered by financial arguments.

A social justification: The digital divide

Closely tied to financial arguments are assumptions promising that open access will reduce the digital divide. Definitions of the digital divide indicate that

- opportunities to access relevant information are allocated unequally; furthermore, the degree to which individuals secure these opportunities depend on social factors; and,
- this unequal distribution has significant social impacts: Whoever has access to relevant information secures better prospects relative to social, economic or health issues.

If information is available freely (with the additional condition that Internet access is a given), individuals usually separated from fee-based information take advantage of open access, in turn highlighting connections to theories of democracy.

Democracy

Concepts of participative democracy assume that there is intense participation in political and societal processes by as many citizens as possible. The broad expertise of citizens is the basis of a truly functioning democracy. This requires open discourse about as many relevant topics as possible, in order to serve democratic principles and to reach rational and reasonable decisions and governance based on broad participation. Civil rights, such as the freedom of assembly and the freedom of the press, are derived from this concept. More detailed thoughts about democracy and participation were formulated by Jürgen Habermas (1984). Both the science-related justification of open access and the participative model of democracy share the same meta-assumption: free access to information and free exchange of information facilitate optimised discussion — regardless of whether it is focused on scientific or political questions.

Sociopolitical justifications

In addition, open access is considered as a means to reduce social inequities, disparities and disadvantages. Assuming that Western societies are – as widely alleged – information societies, information is the most vital resource or good for individuals in these societies. The opportunities and chances to participate, share and use these resources and goods shape these societies. Information creates relationships between actors which can take the form of exchange, trade, power, dominion or disparities. Even if the notion of information societies is superficial (after all, regulation and distribution of information has always given structure to groups or societies), at first glance open access may claim to reduce disparities since everyone — with Internet access — may benefit from access to information.



Recapitulation

At first glance, the moral vibrancy of open access is overwhelming, the notion itself seems imbued with charismatic aura. Seen through the prism of the arguments noted earlier, open access has a moral relevance and scope which goes far beyond the issues of scientific communication. This connotation exists *a priori* and is hedged by an asserted universality of the following arguments: open access appears as a moral necessity that can hardly be questioned or examined (Haider, 2007). Furthermore, the properties of open access are linked to concepts of openness, interrelatedness and globalization (Fröhlich, 1996).

In examining the implicit and explicit assumptions of the aforementioned arguments the following questions are posed:

Is a free and disinterested exchange of information really the prevailing interest of scientists? Or should statements to that effect rather be seen as some kind of “lip service”? Might it not be a more accurate assumption that scientists in reality are acting selfishly, striving for an accumulation of scientific capital that has to be gained and defended in distribution struggles (Bourdieu, 1998; Bourdieu, 2002)?

Does accessibility of information via electronic networks really level social disparities? Or do claims of this nature just prefigure that a technical utopia is turning into a social utopia? (Fröhlich, 1995)

Can the free interchange of information with groups or countries be considered as truly altruistic? Or does it transmit ethnocentrism? (Haider, 2006)



Scientific publishing: A sociological analysis

Journals, impact factors, careers

Scientists seem neither to be very well informed about the potential of open access (Hess, *et al.*, 2007), nor do they use open access publication services in relevant numbers and ways (Deutsche Forschungsgesellschaft (DFG), 2005; Swan and Brown, 2005). Kiley and Terry of the Wellcome Trust explain this reticence on the part of scientists through scientists' position within the circle of production, distribution and consumption of scientific information as illustrated in Figure 1.

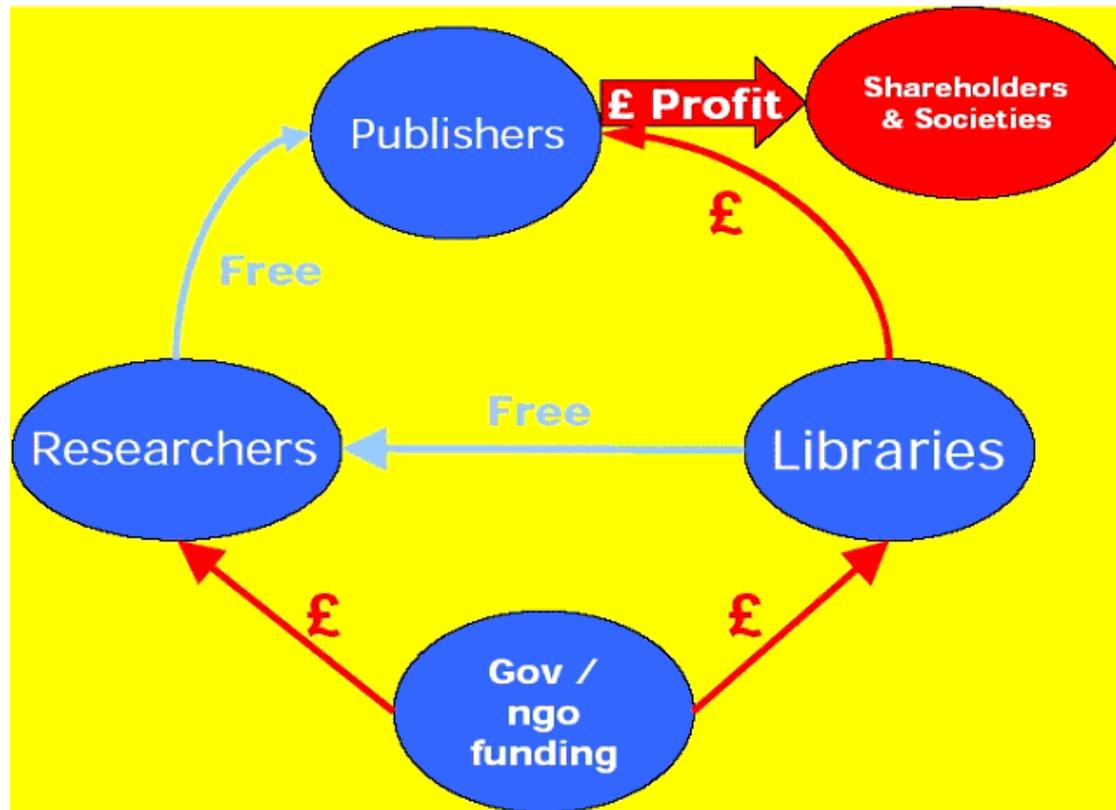


Figure 1: Open access to research literature: A funder's perspective.
Source: Robert Kiley and Robert Terry (2006).

Foundations and government agencies are the major funding sources for research. Researchers in turn publish their results as papers in a variety of journals – mostly fee-based journals – and usually without financial compensation. Libraries pay licensing and subscription fees to offer scientists and their institutions access to relevant information. This access also means access to the results of their colleagues.

Libraries themselves are financed largely by foundations and government agencies. From the perspectives of funders, this process must surely appear as inefficient. Funds are spent to the producers and consumers of scientific information. Scientists as consumers are largely not interested in changing this situation. First, they have to pay neither for the consumption nor access to information. Second, their relationships to other actors have a neutral or positive valence. In most scientific disciplines, there is no circulation of funds between authors and publishing houses. There are no fees assessed for the use of journals subscribed by libraries. Finally, funders even pay the salaries of researchers. Therefore, scientists see no reason to change a situation which offers them so many luxuries.

Figure 1 misses the most salient relation. Between publishing houses and scientists there exists a connection of greatest importance to scientists, a connection which has an eminent positive valence and which at the same time constitutes a dependency. Scientists advance their careers by publishing in journals that enjoy high impact factors (IF). If they do not publish in high-impact journals, their careers will falter. There is a need to publish only in those journals that will award scientific capital.

Economic, cultural and social capital

French sociologist Pierre Bourdieu differentiates between three types of capital — economic, cultural, and social capital [1]. Cultural capital exists mainly in the form of education or cultivation and as knowledge which is aggregated by attending institutions of learning. Cultural capital has three specifications: incorporated (internalized), objectified (represented through objects, books, paintings) and institutionalized (formally codified by academic

titles).

Social capital – generally speaking – encompasses resources which are based on affiliation to a group or a network of more or less institutionalized relationships. A person's specific position is determined by accumulated economic, cultural and social capital.

As a rule, economic capital dominates other types of capital – but, depending on the social field, other field-specific types of capital may even break the dominance of economic capital within a given field. Bourdieu describes a field as

“a universe encompassing all actors and institutions that create and disseminate art, literature or science. This universe is like any other social universe, but follows more or less specific social rules. This relatively autonomous microcosm, equipped with its own rules and laws, is subsumed in the field concept. Like the macrocosm, the field is subject to social rules, but they are different rules. Although the field as microcosm is never entirely independent of the constraints of the macrocosm, it does enjoy a measure of autonomy which can be greater or smaller.” [2]

At the same time, these fields are fields of force, power and struggle:

“Every field, also the scientific field, is a force-field and a realm of constant struggle about the preservation or the change of the forces ruling the field. It is possible to describe a scientific realm like a physical universe with inherent relations of power and of supremacy.” [3]

Bourdieu devotes himself explicitly to the field of science in *Homo academicus* (Bourdieu, 2002) and in “Les usages sociaux de la science” (Bourdieu, 1998). In this specific field, scientific capital complements and dominates the other three types of capital.

Scientific capital and scientific communication

Bourdieu (1998) differentiates two types of scientific capital and the types of power connected to them:

- a. Secular, political, institutional, and institutionalised power, which can be found mostly within the bureaucracy of science and which is accumulated through the use of political strategies. Its transfer and heredity – as with all sorts of bureaucratic capital – is easily achieved.
- b. Specific or individual power, personal prestige, pure scientific capital, based on recognition and to a large extent independent of the secular power, but much more affected by challenges than (a). Its accumulation is based on publication. This type of scientific capital is volatile, which also means it is difficult to transfer. To Bourdieu, this is the purest type of scientific capital.

Bourdieu identifies a citation index as an indicator of scientific capital [4]: This capital is mainly developed and accumulated through publication in journals with a high impact factor.

The reputation is derived from a given scientist's publication record. The impact factor distilled from that behaviour is

- **of symbolic nature:** It is based solely on the value attached to published work by relevant people and their institutions within a given field of science. If this value diminishes, the entire value of the investment is lost. This reputational value transforms into access to relevant resources. Scientific capital is “based on the recognition (or the credit) which is granted by all the peers and competitors in the scientific field.” [5]
- **socially constructed:** It is a regulatory mechanism relative to granting or obstructing chances. In general, these chances reflect the probability to enjoy specific privilege, in the form of lucrative appointments, project fundings or activities as referees or experts. These privileges in turn foster tendencies towards a further accumulation of scientific capital and power. This power brings material profits such as higher incomes as well as the development of valuable relationships. There are also symbolic profits such as professional reputation, access to internal (and therefore valuable) information or membership in exclusive groups or associations. Hence the impact factor is not only is a measure of the quality of scientific information but *is above all a regulatory mechanism in the allocation of privileges.*

Within in the field of science, adherence to orthodox practices and allocation mechanisms can be explained in the same way as in other fields. Scientific capital and careers are “the result of an investment which must pay off. And the holders of the subscription vouchers will defend their ‘capital’ and their ‘profits’ by defending the institutions that are the guarantors of this capital.” [6] Publication in open access journals are mostly ignored in efficiency ratings, evaluations or appointments (Björk, 2004).

The disparate allocation of capital is vital and essential for every field and is therefore

sacrosanct. Actors which have benefited from distributive mechanisms of capital have little or no interest in changing these mechanisms or evening out these disparities – because the disparate allocation of power shapes and structures disciplines. Whoever owns scientific capital has the “chance to set not only the rules of the game but also regularities, for examples the laws governing the allocation of profits and prizes or the decisions regarding which research subjects are important and worthwhile and what is to be considered as extraordinary or as outdated.” [7]

For Bourdieu, the field of science is “a place and an object of battle, in perception as well as in reality.” [8] Consequently, he calls the assumption that there are no distributive mechanisms or distributive struggles in this field *illusio* [9]. Its illusionary essence is revealed in the claim that scientific interests – compared to conventional interests (especially economic ones) – are unselfish:

“at a subliminal level, the ‘pure’ and unselfish interest is an interest in selflessness, a kind of interest that is characteristic of the economy of all symbolic goods: in this economy, it is the unselfishness which carries the reward. Thus, in a certain way, the strategies of the actors are always two–faced, ambiguous, driven by interests as well as disinterested, inspired by a kind of unselfish self–interest which allows for completely antagonistic but equally erroneous (on account of their one–sidedness) description of motives – one hagiographic and idealizing, the other cynical and reductionist in its denunciation of a scientific capitalist as a capitalist like any other.” [10]

This is consistent with the findings of Gerhard Fröhlich (1998). According to Fröhlich, there is a strategic retention of information within or between teams and laboratories, in scientific publications and at scientific congresses — replacing the officially proclaimed free and open competition of ideas. One could even assume this retention of information is not the exception but rather the rule, or at least the prevalent practice. In Fröhlich’s view, the unselfishness of scientists is very limited. He describes the principles of scientific communication as follows [11]:

- Communicate informally *just as much as absolutely necessary* to keep corporations alive.
- *Publish only as much as indispensable* to preserve one’s claim for priority on findings and their originality.
- *Circulate informally or publish as little information of practical use as possible* to prevent competitors from taking competitive advantage of this information.

Fröhlich describes valuable information as objects of secrecy, objects of barter, gifts – generally as objects of value that will not be randomly scattered amidst the scientific public – let alone on the Internet. The retention of information pertains, for example, to details about experiments (so–called *local knowledge*), undocumented information of practical use, information relative to the context of scientific discovery, and of course specifics defined in a very codified jargon [12].

Thus, it seems treacherous to assume the prevailing concern of scientists to be open communication as well as the open exchange of information:

“We are far from the ideal of a free market, which is currently being commended so highly; the effects of such a market can only be wished upon science.” [13]

Open information networks = Excluding information networks?

Fröhlich [14] assents to Bourdieu’s point of view and criticizes at the same time the presumption that Internet–based communication, *per se*, would have a levelling and democracy–boosting effect. In terms of Bourdieu’s theories of fields and distinction, Fröhlich describes computer networks as social fields, especially in their capacity as vertically stratified and structured fields of competition. As in other fields, individuals pursue their strategies, have agendas and are trying to reach their goals when they utilize computer networks. They hope to gain and raise their reputations, build exclusive groups and exclude others. No matter how *open* a network or infrastructure might be, they are devised, shaped and used by individuals. Consequently, their utilization is subject to human interests and necessities like networks constructed for distinctiveness and power.

To Fröhlich (1998), power is a structural feature of all social relations. To him, power means *control over operational resources which are required by others*. Thus, the retention, blockade, and deferral of information is an effective strategy in different competitive fields.

Information ultimately is a ubiquitously valuable good which is intentionally made rare. The strategic, operational, and distinctive value of information decreases as information becomes more accessible. Therefore, Fröhlich argues that professions and other powerful groups or corporations depend on the retention and monopolization of information.

The assumption that the mere availability of information would lead to democracy is a myth. It is also a myth to think that a decentralisation of technical infrastructures — especially the Internet — would lead to a levelling of asymmetric allocations of power (Fröhlich, 1995; 1996). It would be more realistic to expect a centralisation and accumulation of power supported and sustained by the Internet. Before the Web era started, there surely was no equivalent to global warehouses such as Amazon.com. According to Fröhlich, a further concentration of power and capital in cities can be assumed, made possible by the structure of the Internet [15]. Hence, statements about the liberalizing or democratising effects of open access have to be put into perspective. Despite an accelerated exchange and the free accessibility of information, its availability and usability still is subject to a multitude of restrictions.

Digital divide and information poverty, ethnocentrism and a theory of science

Reflections on open access largely ignore not only the field-specific factors but also external implications of this concept. This is especially true for open access relative to notions of the digital divide. In these sorts of discussions, developing countries are usually conceptualised as homogenous entities and as objects – not actors – which can partake in the true promise of scientific information created in western Europe and the U.S. free of charge by consuming open access publications.

The advantages for developing countries may be readily apparent in terms of public health information or primary data. This information may be of immediate practical use, saving researchers in those countries immense expenses and time with their own experiments. Nevertheless, is this research appropriate to questions in developing countries? With Bourdieu and Fröhlich in mind, does this research have value without lengthy, time-consuming and laborious incorporation of scientific and cultural capital?

Jutta Haider (2006) analyzed the connections between open access and *information poverty*. Open access is commonly described as an instrument which reduces information poverty. Countries suffering from information poverty are mostly identified by economic (poor countries) or technical (countries with a weak infrastructure) parameters.

This notion hides a glaring ethnocentrism. The transformation of all societies based on Western societies is almost considered an evolutionary universalism. Furthermore, valuable information is equated with Western science, which some consider to produce correct knowledge without debate. Haider (2006) analysed a notion of *information poverty* by means of Foucaultian discourse analysis. Foucault (1972) describes discourse as a special concept of reality which represents and perpetuates itself in the language it is framed in. A discourse formulates specific rules which determine a view of reality via language. These rules define a specific context, a field of knowledge, a scientific field or even an abstract notion or idea (e.g., globalization). Discourse is tightly linked to power. It pretends to describe reality, but in fact, it prescribes reality.

Haider examined the use of the notion *information poverty* in *developmental discourse* and in *library and information science (LIS) discourse*. Information poverty is tied to LIS (information) and developmental (poverty) discourse (Haider and Bawden, 2006). Both discourses also converge in any discussion about the digital divide. Within LIS discourse, countries suffering from information poverty appear to be objects, consignees of true and correct information. Whoever is labelled as information poor remains passive and is subject to intervention by experts. In this case of information poverty, it is information professionals, information scientists and librarians that are purporting to be benefactors.

This construction perpetuates the subordination of developing countries under the expertise of the Western countries. This hierarchical stratification furthers power and control over the developing countries. If open access is conceptualised as a vehicle to reduce the digital divide, it also reinforces existing dependencies and asymmetric allocations of discursive, political and materialistic power.

This implicitly raises the question whether open access, in our discussion about the digital divide, supports Western imperialism. The basic question regarding open access is whether there is

- a. a widely correct, well-proven (but still approximative) knowledge which is accumulating through evolution and which is represented in science. This position is held, for instance, by Popper (1992).

Or whether there are

- b. several entirely different paradigms of knowledge which are not evolutionary in character, but which are chronologically following one another. This is the position of Kuhn (1970).

Or whether there are

- c. several entirely different paradigms of knowledge which are not evolutionary and which exist simultaneously. This view was formulated by Feyerabend (1975).

Hence, does open access contribute to global standardization or to a homogenization of

cultural patterns?

Liberalising elements

Nevertheless, open access gives scientists from developing countries opportunities to make their own scientific information available free of charge and to distribute it globally. In this way, open access provides opportunities for scientists anywhere to become active partners in scientific discussions. Haider (2005) examined how the production of open access journals is distributed globally. She found that significantly more open access journals are published in developing countries than in developed countries. Although constraints such as article fees and occasionally insufficient or absent technical infrastructures are obstructing open access publishing in these countries (Papin–Ramcharan and Dawe, 2006), open access nonetheless gives the scientists from these countries opportunities to switch more easily from roles of information consumers to roles of information producers. Admittedly, the importance of these journals has to be determined by their impact factors. Open access and non–English journals are underrepresented in impact factor sampling (Dong, *et al.*, 2005). Indeed, Packer and Meneghini (2007) found that journals from the developed world have significantly higher impact factors than those from the developing world. These findings correlate with the results by Braun and Dióspatonyi (2005). They found that researchers from the developing world are rarely found on the editorial boards of high–impact journals. All these studies indicate a strong underrepresentation of scientists and scientific information from developing countries and their exclusion from scientific discourse. It could be assumed that open access will affect only the quantity of scientific information from developing countries. It seems very doubtful if open access will really liberate scientific communication.

Nevertheless, there is a profound and comprehensive interrelatedness between open access and other paradigms of openness, such as open source. All of these notions of openness are viable alternatives to existing intellectual property regimes (Haider, 2007).

Free (in the terms of *open*) access to information is not sufficient to ensure informed discussion. A truly open concept of open access and democracy creates not only opportunities to receive and consume information; it also offers opportunities for publication and reputation building. 

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Notes

1. Bourdieu, 1997, pp. 47–79.
2. “ein Universum, das all jene Akteure und Institutionen umfasst, die [z.B.] Kunst, Literatur oder Wissenschaft erzeugen und verbreiten. Dieses Universum ist eine soziale Welt wie jede andere auch, gehorcht aber mehr oder weniger spezifischen sozialen Gesetzen. Der Begriff des Feldes ist nun dazu da, diesen relativ autonomen Raum, diesen mit eigenen Gesetzen ausgestatteten Mikrokosmos zu beschreiben. Er ist zwar, wie der Makrokosmos, sozialen Gesetzen unterworfen, aber es sind nicht dieselben. Obwohl er sich nie ganz den Zwängen des Makrokosmos entziehen kann, verfügt er doch über eine mehr oder minder ausgeprägte Autonomie.” (Bourdieu, 1998, p. 18, translated by the author)
3. “Jedes Feld, auch das wissenschaftliche, ist ein Kräftefeld und ein Feld der Kämpfe um die Bewahrung oder Veränderung dieses Kräftefeldes. Man kann (...) einen wissenschaftlichen (...) Raum wie eine physikalische Welt beschreiben, die Kräftebeziehungen, Herrschaftsbeziehungen enthält.” (Bourdieu, 1998, p. 20, translated by the author)
4. Bourdieu, 1998, p. 23.
5. “auf der Anerkennung (oder dem Kredit) (...), den die Gesamtheit der gleichgesinnten Wettbewerber innerhalb des wissenschaftlichen Feldes gewährt.” (Bourdieu, 1998, translated by the author)
6. “Ergebnis einer Investition (...) , die sich auszahlen muß. Und diejenigen, die diese Berechtigungsscheine in der Hand halten, verteidigen ihr ‘Kapital’ und ihre ‘Profite’, indem sie diejenigen Institutionen verteidigen, die ihnen dieses ‘Kapital’ garantieren.” (Bourdieu, 1997, p. 23, translated by the author)

7. "die Regeln des Spiels festzulegen, sondern auch die Regelmäßigkeiten des Spiels, die Gesetze etwa, nach denen Spielgewinne verteilt werden, Gesetze, die bestimmen, welche Forschungsgegenstände von Bedeutung sind, die darüber entscheiden, ob etwas als außergewöhnlich oder überholt gilt." (Bourdieu, 1998, pp. 23 f., translated by the author)

8. "Kampfgegenstand, in der Wahrnehmung ebenso wie in der Wirklichkeit." (Bourdieu, 1998, p. 25, translated by the author)

9. Bourdieu, 1998, p. 27.

10. "unterschwellig ist das 'reine', das uneigennütziges Interesse ein Interesse an der Uneigennützigkeit, eine Art des Interesses, die zu allen Ökonomien symbolischer Güter gehört, wo es in gewissem Sinne die Uneigennützigkeit ist, die sich 'auszahlt' (...). So sind die Strategien der Akteure in gewisser Weise immer doppelgesichtig, doppelsinnig, interessengeleitet und interessenlos, beseelt von einer Art Eigennutz der Uneigennützigkeit, der völlig gegensätzliche aber gleichermaßen falsche, weil einseitige Beschreibungen zulässt, die eine hagiographisch und idealisierend, die andere zynisch und reduktionistisch, wenn sie aus dem 'Wissenschaftskapitalisten' einen Kapitalisten wie jeden anderen macht." (Bourdieu 1998, p. 27, translated by the author)

11. Fröhlich, 1998, p. 541.

12. Fröhlich, 1998, pp. 540 f.

13. "Vom Ideal des freien Marktes, den man gerade so anpreist, ist man weit entfernt, die Wirkungen eines solchen Marktes sind der Wissenschaft nur zu wünschen." (Pierre Bourdieu interviewed by Frank Nouchi in 1993 in Bourdieu, 1998, p. 80, translated by the author)

14. Fröhlich, 1998, p. 546.

15. Fröhlich, 1996, p. 296.

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