

Papernomics. Sciences as Games and Means of Censorship

Papernomics. Ciencias y juegos como medios de censura

José Carlos Bermejo-Barrera
Universidad de Santiago de Compostela, España
josecarlos.bermejo@usc.es

Abstract

The journals are basically the only channel through the scientists can make the result of their research known to their colleagues. Scientific journals select the information they publish and guarantee its quality by means of a double blind procedure of censorship by peers. If on the one hand this procedure seems logical as a method for including a study within a consolidated scientific field, it is also true that it can function as a mechanism for censorship. The idea that the works not included in a standard publication lack *a priori* of practically any value is the basis of the career of academic scholars. Starting with this principle, a hierarchical system of scientific ranking has been built among researchers. The basis of his scientific curriculum is the metric of vanity.

Key Words

Scientific journals, curriculum, censorship.

Resumen

Las revistas son básicamente el único canal a través del cual los científicos pueden dar a conocer el resultado de su investigación a sus colegas. Las revistas científicas seleccionan la información que publican y garantizan su calidad por medio de un procedimiento de censura por pares de doble ciego. Si, por un lado, este procedimiento parece lógico como método para incluir un estudio en un campo científico consolidado, también es verdad que puede funcionar como mecanismo de censura. La idea de que los trabajos no incluidos en una publicación estándar carecen *a priori* de prácticamente ningún valor es la base de la carrera académica. Partiendo de este principio se ha construido entre los investigadores un sistema jerárquico de clasificación. La base de este currículum científico es la métrica de la vanidad.

Palabras clave

Revistas científicas, currículum, censura.

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Sciences as games

Recent years have seen the development of a pseudo scientific field known as *sciencemetry* or *epistemetry*. Sciencemetry states that it is capable of performing a scientific analysis of all types of scientific knowledge, and claims to be an autonomous field of knowledge, different from each and every one of the sciences, their history or philosophy, and of their study from an economic or sociological perspective. As an objective field of knowledge, sciencemetry requires command of a method which would be different from those of the other sciences, but which would be applicable to each and every one of them. As an autonomous field of knowledge, sciencemetry, the science of science, or metascience, does not require from its practitioners a command of a specific field of knowledge different from sciencemetry itself, since each and every one of the sciences are its universal object of study.

Sciencemetry studies neither the genesis of scientific knowledge, nor its concrete mechanisms of interaction with economic, social, political or cultural realities, but only science as a delimited and elaborated field of knowledge. To do so, it bases itself on a series of assumptions, which we will now formulate in axiomatic format, and we will demonstrate that they can only be consistent if science is conceived of as a game and not as an actual process of creation of knowledge.

Papernomics: axioms

- 1.a– A reality called science exists.
- 1.b– Science is a delimited and continuous space which can be analyzed by metrics.
- 1.c– All science can be formulated.
- 1.d– All scientific knowledge is explicit.
- 1.e– The manner in which science is formulated and made explicit is by way of its publication.
- 1.f– There is a uniform field in which science is made explicit. It is the field of scientific publications.
- 1.g– The field of scientific publications is delimited by the scientific journals.
- 1.h– All that which cannot be contained within a scientific journal cannot be science.
- 1.i– All scientific journals are uniform and their space of publication is continuous.
- 1.j– A scientific journal's minimum unit is the scientific *paper*.
- 1.k– All knowledge can be formulated in the form of a *paper*.
- 1.l– The value of a *paper* can only be formulated by another *paper*.

1.m– The term *science* is used for referring to the measurable interactions among *papers*.

1.n– The metrics of the interactions among *papers* is called *sciencemetry*.

1.o– Being that science is a continuous space identified with the space of the scientific publications, the value of *sciencemetry* is universal.

1.p– Consequently, any possible statement, analysis or theory must base itself on facts of *sciencemetry*.

1.q– *Sciencemetry* is the primary knowledge of science. All other disciplines which analyze scientific matters from an external point of view must share its methods.

These axioms of *sciencemetry* are constructed as a mimesis of the axioms which define the ideal market of economic theory, even though the creators are not fully aware of it. Nevertheless, it is not possible to establish a bi-univocal projection between the real market and the market of science which could go beyond a mere metaphor because it would end up in an inconsistency. We will now see this by comparing the axioms in these two fields.

Market: axioms

2.a– With the term “market” we refer to a delimited and continuous space in which all merchandise circulates and which can be subjected to metrics.

2.b– In an ideal market we have three variables:

a– The whole of all the merchandise which possess a value.

b– The monetary mass which allows for the quantification of the value of all the merchandise.

c– The agents who interchange the merchandise in the market.

2.c– With the term “currency” we refer to the monetary mass which circulates within a market.

2.d– The currency has value because it is guaranteed by its issuing bank.

2.e– The totality of the currency in a market could purchase the totality of the merchandise with exchange value in said market.

2.f– With the term “price” we refer to the fraction of the monetary mass which measures the value of a specific merchandise within a particular market.

2.g– The proportion between the value of a specific merchandise and the value of all the merchandise within an ideal market is the same as that between its price and the totality of the monetary mass:

$$V_m/VM = P/MM$$

- 2.h– The market's agents compete for the acquisition of the merchandise.
- 2.i– An economic agent's ownership of a merchandise is exclusive.
- 2.j– The merchandise owned by one economic agent cannot be owned by another, unless it is exchanged.
- 2.k– The exchange of merchandise and its accumulation is the basis of economic life.

These axioms of the market cannot be applied to the reality of scientific publications. Nevertheless, an attempt to do so is made with the objective of creating a metrics similar to that of the market. We will now see how the application of these axioms results in inconsistency.

Papernomics as a pseudo-market

- 3.a– The real space of the sciences is not a delimited space; it is an open space.
- 3.b– Science is a process of creation, transformation and abandonment of different forms of knowledge.
- 3.c– The number of sciences can be incremented. The interrelationships among them are constantly reformulated. Their objects of study and their methods and instruments increase and transform continuously.
- 3.d– The real space of the sciences is an infinitesimal space and can not thus be analyzed with arithmetic.
- 3.e– There is no delimited space in science similar to that of a market with a finite and measurable amount of merchandise.
- 3.f– There is no pattern of measurement of the sciences similar to the monetary mass identifiable with the whole of the scientific publications.
- 3.g– This is so because there can be no issuing bank for the currency of science.
- 3.h– There can be no issuing bank for the currency of science because such a bank would need to be in possession of all the effective and foreseeable scientific knowledge, thus nullifying the value of scientific investigation.
- 3.i– The equivalence between monetary mass and fiduciary currency cannot be used as a model of growth analysis of scientific knowledge because fiduciary currency must be exchangeable into real currency within a predetermined period and according to an established procedure.
- 3.j– In the same manner, the mechanisms of inflation cannot be applied to the field of scientific knowledge (although they could be applied to the number of its publications)

because said knowledge must always be subjected to facts that are independent of the investigator's will, while the issuing of inflationary currency is the responsibility of the issuing bank (which is inexistent in the case of science).

3.k– The growth of knowledge has its own logic derived from the different possible observations of the facts, the instruments and the methods of analysis of each specific field.

3.l– Consequently, sciencemetry (as a universal metrics of science) cannot analyze the processes of the increment of knowledge in a manner similar to that in which the theory of economics does with the market in its attempt to forecast economic development.

3.m– If there is no monetary mass guaranteed by an issuing bank within the field of scientific knowledge, said knowledge cannot be subjected to metrics.

3.n– The only thing that can be subjected to metrics are the publications considered as rhetorical units within a field of writing: the scientific journals.

3.o– If we apply the market equation of section 2.g, we conclude that since there is no monetary mass of scientific knowledge (because it is an infinitesimal process), the relationship between the value of a scientific paper within the whole of all the papers which define a field and the quantity of innovative knowledge contributed to said field would be:

$$V_p/VP = Q_k/T_k$$

With Q_k being the quantity of knowledge contained in the scientific paper, and T_k the total knowledge of that specific field.

But, being that $T_k = \infty$

$$V_p/VP = Q_k/\infty$$

Then

$$V_p/VP = 0,$$

which proves the futility of establishing a metrics of scientific knowledge. Nevertheless, sciencemetry does make sense if we define science as a game.

Axioms of the game

4.a– With the term “game” we refer to a delimited and continuous space which can be subjected to metrics.

4.b– Every game must have a finite number of fixed and clearly defined rules.

4.c– For a game to exist, it must have agents. These agents are called “players”.

4.d– Every game is a fiction. It can be played only by those who accept the validity of its rules permanently or temporarily. Every game is, therefore, a mimesis.

4.e– A game's players compete for a reward in the same manner that a market's agents compete for money.

4.f– Being that a game is a mimesis, its rewards are intangible and must have a specific value different from an economic value.

4.g– The economic rewards which may be associated to the intangible rewards must have a secondary value; otherwise, the game would become corrupted.

4.h– A game's rewards are measurable with the game's own metrics: points, goals...

4.i– A game's players attempt to accumulate the greatest number of intangible rewards.

4.j– The accumulation of numerous intangible rewards give prestige to a player.

4.k– This is the reason why almost all games establish scales or rankings which measure the intangible merits obtained.

4.l– If a game's players were to stop accepting its rules and no longer shared the mimesis which made the game possible, the game would cease to exist.

4.m– The values of the players of a game are not shared by anyone but the players of said game, and may seem strange or incomprehensible to external observers.

Contrary to what occurred in the case of the market, sciencemetry fulfills each and every one of the axioms of the game, thus reducing the processes of the development of scientific knowledge to a mere academic or editorial game, as we will now see.

Papernomics as a game

5.a– The space of the scientific publications is a delimited and continuous space which can be subjected to metrics.

5.b– Within the space of the scientific journals belong those journals which are considered as such *a priori* (in other words, before the publication of a paper).

5.c– The rules that permit the publication of a paper in a scientific journal must be explicit and fixed throughout the process of publication.

5.d– The publication of a paper in a scientific journal is not possible if the author or authors do not believe in the value of that specific journal.

5.e– The publication of a paper in a scientific journal allows obtaining an intangible reward which is known as scientific or academic prestige.

5.f– This reward may generate future academic or economic benefits, but these benefits must be secondary to the intangible value of scientific prestige.

5.g– The intangible benefits must be such that they can be submitted to metrics so they may serve as rewards for the actors or players of the game of publication; otherwise, the game would lose its meaning.

5.h– Since the unit of measure of sciencemetry is the scientific paper and the universe of the scientific papers, instead of knowledge, it is a delimited space; therefore, all metrics of the intangible rewards of publication must be constructed upon the minimum unit which define its intangible value.

5.i– The metrics of scientific papers correspond bi-univocally with the metrics of rewards of all games.

5.j– For this reason, the metrics of the papers must permit the establishment of hierarchies or rankings.

5.k– The value of a publication's ranking is shared only among those who already believed in it previously.

5.l– Therefore, the value of a sciencemetric type of ranking is really a game.

5.m– The fact that sciencemetry is bi-univocal with the world of games explains the ease with which its followers use sport metaphors.

5.n– The use of metaphors is necessary when the content of a thought cannot be made explicit.

5.o– The use of sport metaphors by the followers of sciencemetry is in no way banal or gratuitous. It is, instead, proof of their inability to fully analyze the rules of the game which they are imposing.

5.p– The institutionalization of scientific publications as a formalizable game governed by norms is beneficial to the large publishing companies which sell the most important journals.

5.q– The publishing world is a real economical world governed by the laws of the markets.

5.r– Without the publishing world, the publication of science would not be possible.

5.s– But the publishing world may also harm the development of science by favoring inflation in the publication of measurable papers.

5.t– The inflationary process of the publication of papers obeys the law of offer and demand, which is governed by the economic benefits of the large publishers and the pressure of publication exerted upon professors by academia.

5.u– The offer and demand governing the ranking in the game of scientific papers corresponds only partially with scientific knowledge by simultaneously favoring and blocking it.

For all these reasons we may conclude by stating that scientemetry or epistemetry are no more than a sort of *papernomics*, an assumed economy of the publication of papers. *Papernomics* reflects neither the actual processes of the creation of scientific knowledge, nor the unquestionable interrelations between techno-scientific research and the dynamic economy of the production of merchandise and the creation of wealth, nor is it capable of analyzing the complex interrelations among science, society, politics and culture. Papernomics is nothing more than the creation of a process of mimesis that establishes certain rules of the game which may end up controlling the whole process of scientific knowledge and academic life. Being a mimesis, however, it vanishes when the agents stop believing in it.

This essay has endeavored to be one further attempt to defend reason against a new faith which, just because it is new, does not mean it is less intolerant than others that came before it.

Calculus Vanitatis: how to control professors by measuring citations

According to German novelist and essayist Thomas Mann, an author's vanity must always be present in every work of literature. This vanity, however, must remain in the background without appearing in the work itself, and much less in the forefront.

I will now attempt to show that the system on which bibliometry is based (the system of citations) has no relationship with the development of scientific knowledge. Instead, it merely represents the metrics of the scientists' vanity, a vanity stimulated by the economic interests of the large publishing concerns which practically monopolize the sciences, and also by the structure of the system of academic honors which are themselves the basis of economic and institutional benefits such as remunerations and appointments. To achieve my purpose, I will develop a simple series of evident axioms (as all axioms should be) and deduce their consequences.

Axiom 1: A field known as bibliometry exists in which it is possible to measure scientific studies according to objective criteria without actually reading the studies themselves.

Axiom 2: In bibliometry there is an ontological unit called the scientific paper which establishes such a measurement.

Axiom 3: Every paper must have at least one author.

Axiom 4: The fact that a paper might be the work of more than one author does not alter its metrics because in most scientific fields there are scarcely any isolated authors.

Axiom 5: A paper's authors have property rights over the paper, and these rights can be both intellectual and economic.

Axiom 6: Nobody may appropriate another author's paper, nor publish it as a personal work, and if any part or all of the content is used, this must be indicated by means of a citation.

Axiom 7: A citation is a statement which makes reference to the author or authors of a paper.

Axiom 8: Since citations refer to authors, if the rhetorical convention of mentioning the names of the authors were suppressed, it would no longer be necessary to use the system of citations.

Scholium: Being that the prestige of an academician or researcher is derived from intellectual work, a system has been developed which serves as an incentive for publishing papers in certain delimited media, and these are the scientific journals of renowned prestige.

These journals are products which are sold in the market and thus their makers are interested in sales and diffusion. Following the laws of the market, according to which every agent tries to maximize benefits and minimize costs, every publisher aims to corner or monopolize a sector of the scientific publishing market. When publishers succeed, totally or partially, they force institutions and scientists to subject themselves to pre-established criteria of admission and exclusion and also to spend money buying the products of the publishers, giving way to the paradox that researchers who write scientific papers usually give them to the large publishers for free, but then have to purchase the journals at very high prices.

This is so because in this particular case money is exchanged for honors, having accepted without dispute the fact that prestige is derived from publication in certain media. If researchers, however, were to deposit their papers online and make them available freely in electronic format, the publishing market would disappear, but the names of the authors would be retained.

Counterfactual conditional: If all the scientific studies published around the world were made available for free, the large publishing concerns would disappear. Their disappearance would not suppose the end of science, as publishers would like us to believe – according to whom the result would be that those investigations which generate patents from which economic benefits can be obtained, or provide technological-military power, would remain outside the field of publication.

Thus we can state that the field of publication is not necessarily the only and exclusive field of scientific knowledge, but simply a field where part of this knowledge is conventionally exhibited.

The conventions that rule this market (those that regulate the admission criteria of scientific papers in renowned journals of the bibliometric field), can be a guarantee of quality of those studies, but may also function as mechanisms of censure when an investigation does not adjust itself to the conventionally established formal parameters or clashes with the interests of the academicians who evaluate the works, or the economic interests of those who control the publishing field, a field in which the present work, for example, would not find a publisher. Thus, we can state that it has been a great economic, political and institutional success to have managed to make all scientists believe that works not included in a standard publication, lack *a priori* of practically any value. This success has been obtained not only by using clear criteria of

ensorship and monopolization of the fields of knowledge, but also by creating a hierarchical system of vanity among researchers.

Definition of vanity

All human beings naturally look for recognition from others – recognition of ourselves, our actions and our works – because we are social beings. Within the micro society of scientists, this recognition is based fundamentally on their work – their discoveries – which are considered achievements. Discoveries and their subsequent publication form part of the social mechanism of achievement because a convention has been established that publications must not only have at least one author (which is inevitable), but also that the name of the author or authors must be cited.

Within the area of scientific publications, all citations are basically positive. This is because the sciences have almost abandoned the custom still in practice within the humanities of dedicating a large part of a text to demonstrating that the opinions of other authors are false. Even in this case, however, a citation continues to be positive because the honor taken away from the work of one author is assumed by the person who takes it away.

We could, therefore, state that a scientific paper possesses a constant honor which belongs to the paper's author if the citation is positive, or to the author who takes away the honor when the citation is negative.

Thus:

$$Q(h) \text{ paper} = k$$

Recognition is a basic social mechanism, but the insistence of recognition by exhibiting one's honor is a vice called *vanity*, which, as is the case with all the vanities, not only forms part of the social order, but also of its foundation, the same as is the case of avarice within the framework of economics.

This idea was already touched upon in 1714 by Bernard Mandeville in *The Fable of the Bees: or, Private Vices, Public Benefits*, as well as in his treatise of 1724 titled *A Modest Defence of Public Stews: or, An Essay upon Whoring as it is now Practiced in these Kingdoms*. The latter refers to a much more base pleasure than that of the intellectual paper, but not only forms an unfortunate part of social reality, but also constitutes a deplorable parameter of great magnitude both in the current economy as well as in the economy of Mandeville's days.

Admitting, then, that citing a paper is simply the citation of the proper name of an author or authors, and not a measurement of knowledge, and that the pride taken in the accumulation of citations is proof that it becomes vanity when exhibited more than required, we will try to develop a metrics of vanity.

This proof will be for some a contribution to bibliometry, and for others a satirical piece, or even a source of honor for those authors who can successfully defend the

system of scientific bibliometry by bringing to light the ridiculous pretensions of the present author, thus obtaining greater honor for themselves.

Our logic can be included within one of the minor branches of mathematics or logic, such as that developed by Reverend Charles Dodgson, professor of mathematics at Oxford University and better known as Lewis Carrol, author of *Alice in Wonderland*. He developed his well-know “Pillow Problems” designed to fight the persistent insomnia he suffered during the cold and solitary nights at his college (Cohen, 1995). While the current author’s literary talent and knowledge of mathematics (basically null) is far from Reverend Dodgson’s, he also hopes to never achieve the level of unhappiness which formed part of that brilliant author’s life.

My metrics proposal could be considered an academic variant of the mere arithmetic consisting of counting sheep with the purpose of falling sleep. Each academician can make his or her own calculation before going to sleep, and if they can thus fall sleep it would be good for their health, although it would hurt the pharmaceutical industry’s production of hypnotics. If, however, having to perform these calculations causes a relapse of insomnia, the pharmaceutical industry will benefit; thus, the following proposal would be economic and socially profitable either way.

Metrics of vanity

Offense comes not from those who wish to offend but from those who have the power to do so, and praise can tarnish reputations depending on whom it comes from, as it is well known. Why, then, is it accepted without argument that the value of all citations, whether positive or negative and independent of whom they come from, must always be equivalent? By accepting the axioms of bibliometry for scientific papers but extrapolating them to citations, I will attempt to demonstrate (through a process of reduction to the absurd) that the so-called metrics of bibliometry is either practically impossible or can give way to a system of delirious complexity. To do this I will introduce the axiomatics of citations prior to its development into a metrics.

Axiom 1: Not all citations have the same value, because the value depends on the person who makes the citations and the journal in which they are published.

Axiom 2: A citation is not a whole number; it is a fraction.

Axiom 3: The quality index of a citation depends on the quality index of the journal that publishes it.

Axiom 4: Hipercitation. The term “hipercitation” means that an article published in a journal with a low quality index has been cited in a journal with a higher quality index.

Axiom 5: Hipocitation. The term “hipocitation” means that an article published in a journal with a high quality index has been cited in a journal with a lower quality index. In this case, the journal with the low quality index tries to obtain prestige by citing a journal with a high quality index.

We can therefore develop the following formula. The quality index of a citation is the fraction between the quality index of the journal containing the citation and the quality index of the journal cited:

$$Q_i(\text{citation}) = Q_i(\text{citing journal}) / Q_i(\text{cited journal})$$

Consequently, the quality index of an author's citations is the sum of each of the author's citations modified by the quality coefficient of each citation:

$$Q_i(\text{citations}) = C_1(\text{qual. coef.}) + C_2(\text{qual. coef.}) + C_n(\text{qual. coef.})$$

Axiom 6: A citation not only has quality, but also quantity. It is one thing to cite a paper for one fact, and it is different thing altogether to cite it for a new law, theorem or theory. We must therefore establish a metrics of a citation's quantity in a scale agreed upon by the scientific community, and consequently modify the value of the citation (once its quality has been corrected) multiplying it by its quantity coefficient.

Thus the value of a citation would be:

$$\text{Value}(c) = 1(Q_i) + 1(E_c)$$

With E being the length or the quantity of the citation.

The total honor of an author's citations would then be:

$$H(\text{scientist}) = C_1(\text{Value } C_1) + C_2(\text{Value } C_2) \dots + C_n(\text{Value } C_n)$$

If we wish to be faithful to the truth, however, we must introduce two new corrective criteria which correspond to a new axiom.

Axiom 7: Since the number of papers published within any specific period of time varies greatly from one field of knowledge to another, the absolute probability of a citation must be taken into account, which depends on the total number of papers published in – let's say – one year. The greater the number of papers, the greater the probability of citations, as has been mentioned by A.H. Goodall (Goodall, 2010); thus, another corrective index must be included, according to which the value of a citation is inversely proportional to the number of papers published within any specific field.

The index would be:

$$P(c) = N(\text{citations}) / N(\text{papers})$$

It goes without saying that these would be the papers which deal with one particular subject, and not all the papers within a field. This criterion is necessary because the fact that a paper is not cited in an article of that same subject is a clear sign of disapproval, and even though it should not be treated as something negative, it must be arithmetically considered because the denial of an honor is an affront, while a citation is an honor.

Consequently, a scientist's honor would be equal to the sum of each of his or her citations multiplied by the probability of being cited in that particular field and the value of each citation:

$$H(\text{scientist}) = C1 [P(c) (\text{Value } C1)] + C2 [P(c) (\text{Value } C2)] \dots + Cn [P(c) (\text{Value } Cn)]$$

Since the indexes of probability of citation vary with the publication of each new paper, including the paper currently cited which is now added to the total number of papers, these indexes must be revised periodically. It would seem reasonable to do so at least once a year. The calculation would be so complex that a spreadsheet would have to be designed which would include all the variables and would automatically adjust the metrics of vanity or of obsessively exhibited honor. Such a spreadsheet would clearly be an object of intellectual property and payment for its use would be mandatory. It could be purchased independently or as a part of a package of journals put out by multinational publishers. Thus, following Mandeville's theory, such private vices would give birth to a new public prosperity.

The improvement of the bibliometric system, or maybe its reduction to the point of absurdity and delirium, would also bring about other consequences for the scientific community.

Scientists could rest peacefully because their work would still be valued without being read by anyone but the reviewers, the authors themselves, and by those who have cited them, while all other members of the scientific community would remain at the margin of the genesis of the author's honor. Although there is a certain nuance to the issue because the articles that cite an author's article would not be published unless they were favorably reviewed; thus, in the final analysis, everything would depend on the editorial reviewers, thus confirming the system's validity.

In this system we find that the figure of a reader interested in an issue is of practically no interest to a scientist because the value of an article which is read but not cited is zero. Consequently, the search of knowledge for knowledge's sake makes no sense because this type of global or general knowledge will never be acknowledged, and the effort put into acquiring it will have been in vain within the system of curricular honors.

In the bibliometric system, an article is neither read nor studied with the purpose of judging it, and the doubts that a non-reviewer or non-citing author might have about it are rejected by exhibiting the honor index of the publications of the author whose honor has been slighted. This author and the scientific community in general may rest in peace in the face of criticisms that arrive from outside the bibliometric system, unless they are coherent and wish to develop that same system scientifically to the final consequences. In which case, they would undoubtedly become new victims of academic anxiety, obsessed with the continuous and constant variations of their prestige indexes. If they were to perform these calculations nightly upon their pillows, the arithmetic would become a nightmare and they would have to resort to the sleeping pills developed by their colleagues.

As far as the author of this article is concerned, he feels a certain peacefulness and tranquility because it will surely never be read by any of the proponents of bibliometry, since it will never be published by any of the journals they *index* themselves. If it were to be published, it would not be cited because they would not wish to grant an honor to an author who modestly and with every consideration and respect wishes to explain to those readers who lack authority, honor and prestige, the fact that scientific knowledge is no longer disinterested, critical and skeptical – as its own nature requires – but has become, instead, thick tangle of private interests and vanities.

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Profile

José Carlos Bermejo-Barrera is Professor of Ancient History at the University of Santiago de Compostela (Spain). An expert in philosophy of history and historiography, he has studied the Ancient Greece and Rome myths. Among his major works, the series that include the term “Historia teórica” stand out: *Ensayos de Historia teórica* (Madrid: Akal, 1987), *Replanteamiento de la historia: ensayos sobre Historia teórica II* (Madrid: Akal, 1989), *La fundamentación lógica de la historia: Introducción a la Historia teórica* (Madrid: Akal, 1991), *Genealogía de la historia: ensayos sobre Historia teórica III* (Madrid: Akal, 1999) (with Pedro Piedras Monroy), *Qué es la Historia teórica* (Madrid: Akal, 2004), and *El fin de la historia: ensayos de historia teórica* (Madrid, Akal: 2007), *Introducción a la Historia teórica* (Madrid, Akal: 2009). He has recently published *La consagración de la mentira. Entre la realidad y el silencio* (Madrid: Siglo XXI, 2012).

José Carlos Bermejo-Barrera es catedrático de Historia Antigua de la Universidad de Santiago (España), es especialista en filosofía de la historia e historiografía, y estudioso de los mitos de la Antigua Grecia y Roma. Entre sus principales obras destacan la serie que lleva como título el término “Historia teórica”: *Ensayos de Historia teórica* (Madrid: Akal, 1987); *Replanteamiento de la historia: ensayos sobre Historia teórica II* (Madrid: Akal, 1989); *La fundamentación lógica de la historia: Introducción a la Historia teórica* (Madrid: Akal, 1991); *Genealogía de la historia: ensayos sobre Historia teórica III* (Madrid: Akal, 1999) (escrito con Pedro Piedras Monroy); *Qué es la Historia teórica* (Madrid: Akal, 2004); *El fin de la historia: ensayos de historia teórica* (Madrid: Akal, 2007); *Introducción a la Historia teórica* (Madrid: Akal, 2009), José

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