



Universiteit
Leiden
The Netherlands

Nature and history : towards a hermeneutic philosophy of historiography of science

Bouterse, Jeroen

Citation

Bouterse, J. (2016, February 25). *Nature and history : towards a hermeneutic philosophy of historiography of science*. Retrieved from <https://hdl.handle.net/1887/38041>

Version: Corrected Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/38041>

Note: To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/38041> holds various files of this Leiden University dissertation

Author: Bouterse, Jeroen

Title: Nature and history : towards a hermeneutic philosophy of historiography of science

Issue Date: 2016-02-25

Chapter 1: Introduction

1.1 The World in History of Science

This thesis is about the role of the world in history of science: the question what role the things scientists study play in our historical accounts of the development of science. As such, it is about a foundational question in history of science, belonging to philosophy of history of science. As I will try to show in this introductory chapter, this question touches upon many other issues. Generally speaking, different answers to questions about the role of the world are connected to different views about what the function and scope of history of science is, and how it should relate to its subject matter – the history of science – and to the science whose history it studies.

The question of the role of the world brings into focus heated controversies in history of science and related fields. According to some scholars science is, in the end, all about the world, and in order to understand why current theories about the solar system are what they are, what we need to understand is the solar system itself. According to others, this approach would lead inexorably towards Whiggism and ‘scientists’ history’, robbing historiography of its autonomy and critical potential and turning it into the handmaid of science. A third perspective tells us that it is unhelpful to try to put a conceptual fence between scientists and the world that they study, and that without such a fence, the question of the role of ‘the world’ in history of science turns out to be meaningless.

These possible perspectives, and others, will be dealt with extensively in later chapters, and I will build on them to formulate my own position in the final chapter of this thesis. In the remainder of this introduction, I will try to sketch out some of the motifs with which I believe controversies about the explanatory role of the world in history of science may be fruitfully connected. These are, first, the question to which extent science can be historicized at all; second, the metaphor of history of science as ‘bridging’ some kind of gap – a gap between science and the humanities, or between nature and culture, or between science and tradition; and third, the problem of the autonomy and authority of history and science.

1.2 History of Science and the Sciences

One important tension that haunts the relation between history of science and science is that between the apparent history-transcending nature of scientific results and the historicity of scientific activity.¹ One way to resolve this tension is to declare only the latter to be amenable to historical research, and say with Alistair Crombie that “the results of scientific activity may be to a large extent impersonal and timeless, but the activity that produces

¹ Cf. Chin (2014, 316) on the relation between ‘subliming’ and ‘subverting’ perspectives and their different stances with regard to the contingency and historicity of science.

them is an activity of particular men sharing in the conditions of life, opportunities, and much of the intellectual outlook of a given society and period".²

This strategy, distinguishing science as an activity from scientific results, is most pronounced in Helge Kragh's distinction between two senses of science: S1 and S2. S1 he defines as:

a collection of empirical and formal statements about nature, the theories and data that, at a given moment in time, comprise accepted scientific knowledge. [...] Since S1 is not really conceived as human behavior, it is not the kind of science that would be likely to appeal to the historian.³

It seems here that Kragh considers the finished product of science to be outside historical interest, since it is not really part of human behavior. This is confirmed when Kragh goes on to define S2:

the science (S2) that is historically relevant consists of the activities or behavior of the scientists, including factors of importance to this, in so far as these activities have been connected with scientific endeavours. Thus S2 is science as human behavior whether or not this behavior leads to true, objective knowledge about nature. S2 encompasses S1 as the result of the process but the process itself is not reflected in S1.⁴

This is a somewhat confusing image: historians of science are interested in S2, which encompasses S1, but S2 also becomes invisible in S1. The distinction Kragh makes may be likened to that between theology and Church history; Church history does not coincide with abstract thought about the divine, but may encompass it. But would we say that in that case, this history is not reflected in the resulting theology?

Kragh wants to do justice to the intuition that there is something to science that is not a straightforward result of historical human behavior, but he also wants to talk historically about science. This makes the split between S1 and S2 understandable. However, such a split strongly suggests that insights in the historical aspects of science may turn out to fail to touch at all upon its non-historical aspects. Some authors have been skeptical as to whether science has anything at all to learn from an understanding of its own history – "does one make better cabinets for knowing the history of carpentry?"⁵ This rhetorical question, to be sure, could turn out to have an affirmative answer for many reasons,⁶ but if

² Crombie and Hoskin (1963, 757).

³ Kragh (1987, 22).

⁴ Kragh (1987, 23).

⁵ Turner (1990, 23-24).

⁶ Guerlac (1959, 238-239); in general, see Maienschein (2000) and Maienschein and Laubichler (2008) for arguments upholding that awareness of history can improve scientific practice.

we hold on to the supposition that there is an essentially a-historical aspect to science, the scope of history of science will always turn out to be limited.

It seems that the scope of historiography is unnecessarily restricted by an insistence that historians are not interested in any aspect of science that is commonly supposed to be grounded in something other than history. In practice, as Lorraine Daston and Peter Galison have noted, history of science in the past decades refuses above all “to exempt anything, no matter how seemingly self-evident, from historical scrutiny”.⁷ We need to make sense of what this means, but at least it should not be the case, as Larry Laudan complained in 1990, that historians “[attend] to virtually everything about [...] scientists *except their ideas about the natural world*.”⁸

Laudan perhaps confused a refusal to ascribe an important role to the world in historical accounts with a refusal to deal seriously with scientists’ beliefs – as we will see in chapter 5, the ‘Strong Programme’ in the Sociology of Scientific Knowledge (SSK) has provided some arguments why in explaining scientific belief formation, we should avoid reference to the external world. But we can only agree with him that there is no reason why scientific beliefs about the natural world should not be of historical interest – after all, these beliefs are themselves historically important. Therefore, we should let go of the split between S1 and S2.

This leaves open the question whether history in fact matters to scientific beliefs, and what this means. Is science not “an on-going present which swallows its own past”?⁹ In chapter 2, we will consider this question in terms of the contingentism-inevitabilism debate, and in chapter 4 we will consider reasons for believing that in the end, the past is not reflected in scientific results. The tension between ‘being about nature’ and ‘being historical’ will not be resolved quickly, but our attitude towards it ought to be that an affirmation of the historicity of science does not amount to undermining the scientific enterprise.¹⁰ As Ian Hacking said (paraphrasing Nietzsche): “no longer shall we [...] show our respect for science by dehistoricizing it.”¹¹

⁷ Daston and Galison (2012, 30).

⁸ Laudan (1990, 51).

⁹ Alder (2006, 298).

¹⁰ See also Kuukkanen (2011, 597-598) on the distinction between scientific knowledge as being about every time and place on the one hand, and being true in any time and place on the other.

¹¹ Hacking (1983, 16).

1.3 A Bridge between Two Cultures?

Some authors have ascribed to history of science the task of bridging the gap between the sciences and the humanities.¹² This is plausible enough, since as a branch of history it belongs to the humanities, and it seeks to understand the sciences. However, the question of what exactly the divide between the sciences and the humanities entails is a complex one.¹³

The distinction is often interpreted through the ‘two cultures’ framework sketched by C.P. Snow in his 1959 Rede lecture, which banks on supposed difference in the attitudes of ‘literary intellectuals’ and ‘scientists’ towards progress. According to Snow, scientists “have the future in their bones”;¹⁴ their knowledge and mentality is suited to finding technological solutions to problems of overpopulation and poverty. But within the context of history of science, we find an altogether different formulation of the distinction by George Sarton. Sarton laments the “difference of opinion, of outlook, between men of letters, historians, philosophers, the so-called humanists, on the one side, and scientists on the other.”¹⁵ The task of the historian of science, according to Sarton, is to reconcile the sciences with the humanities.¹⁶

Contrary to Snow’s, Sarton’s aim is anti-technocratic and anti-utilitarian, and he specifically chastises humanists for their impoverished utilitarian view of science.¹⁷ The progress of science as a revolutionary force in history suggests that there is an antithesis between science and tradition, which may lead us to forget that many aspects of science have built on historical developments. The historicity and humanity of science are connected; declaring the past dead means dehumanizing the scientific enterprise.¹⁸ History of science is to save the ‘humanity’ of science by reminding us of its historicity.

Sarton compares the writing of the history of science to the writing of a biography of a great man, the main point of which would be “to explain the development of his genius, the gradual accomplishment of his special mission.”¹⁹ The history of mankind is a history of its creation of beauty, justice, and truth – things which need no definition because we will recognize them when we see them – and this creation takes place in history. Science is special in this regard because it is the only tradition that is clearly cumulative.²⁰ However, its progress consists not in a transcending of its human origins in a movement towards objectivity, but rather in an unfolding in history of the relation between man and nature. “Nothing could be more foolish than to oppose the study of nature to the study of man.”²¹

¹² E.g. Butterfield (1957, vii).

¹³ See also Bouterse and Karstens (2015).

¹⁴ Snow (1959, 10).

¹⁵ Sarton (1931, 69).

¹⁶ Sarton (1953, 14).

¹⁷ Sarton (1931, 29); cf. also Sarton (1952b, xi-xii).

¹⁸ Sarton (1952a, 8).

¹⁹ Sarton (1931, 21).

²⁰ Sarton (1931, 24-31).

²¹ Sarton (1931, 39).

Sarton declares science to be both human and about nature at the same time. “Each scientific result is a fruit of humanity, a proof of its virtue. [...] Each time that we understand the world a little better, we are also able to appreciate more keenly our relationship to it.”²² He also shows how taking seriously the science we have at one point in history does not require us to say that from that point, the past has disappeared:

Far from there being any conflict between science and tradition, one might claim that tradition is the very life of science. [...] Science is not simply the top of the tree; it is the whole tree growing upward, downward and in every direction; the living tree, alive not only in its periphery but in its whole being.²³

The complexity of this tree can be understood only if we study its growth from its beginnings.²⁴ Sarton gives an example of how to historicize science (even critically)²⁵ without giving up its relation to nature.

However, this particular bridging of the gap as Sarton perceives it puts a lot of pressure upon terms such as ‘reason’ or ‘genius’, which suggest that the values for which science stands are themselves transcendental or at least universally (and a-temporally) human. This is confirmed when Sarton says that “the views of Einstein were accepted because their truth was proved; those of Velikovsky were rejected because they were unproved or rather unprovable. That is all there is to it.”²⁶ Of course, we believe with Sarton that Einstein got it by and large right, and that Velikovsky got his attempt to re-write both history and astronomy tremendously wrong; but what does it entail to say that this is all there was to it, and to see this as a model of how battles between reason and unreason play out in history?²⁷ Do we not need to explain what it means to ‘prove’ something in a particular historical context, and to trace how that particular context has come about? Surely, the simple fact that we know that Velikovsky got it wrong does not suffice to explain why others believed he got it wrong, or – to complicate matters even more – it does not all by itself explain why *we* believe he got it wrong?

Even if we, like the young doctor in Molière’s exam, upheld that we believe things because they have a ‘quality of truth’ to them, it seems that such a view would fall short of genuinely historicizing science. If we can safely inject history-transcending concepts such as genius, reason and truth into history of science because these are rooted in our humanity, then what meaning is there in the claim that we need to understand the scientific tradition – the whole tree – in order to understand its most recent time-slice?

²² Sarton (1931, 68)

²³ Sarton (1952a, 12).

²⁴ Sarton (1953, 6).

²⁵ Sarton (1952a, 15).

²⁶ Sarton (1953, 37).

²⁷ See Gordin (2012) for a contextualization of the Velikovsky affair, which turned out to have a longer tail than Sarton (who played a small part in it himself) knew at the time.

1.4 Science and Its Past

Another way of fleshing out the bridging metaphor can be found in the thought of Reijer Hooykaas: in a 1982 article, he remarks that science and the arts have alienated themselves from each other more and more, and proposes that history of science has a particular cultural mission here.

The humanities are concerned with the thought and actions of people, and the sciences with nature as distinct from human culture; but in history of science, we see that the human element does not get eliminated – which is why it can be the object of a humanistic discipline. After all, there are no natural scientists “in a chemically pure condition”: that scientists live in a particular society and family, and have particular character traits and beliefs, influences their thought, however hard they try to eliminate these conditions and be objective.²⁸ “History shows that the whole person is involved in the natural sciences as well as in the humanities.”²⁹

This is what enables the bridging work of history of science for Hooykaas: in showing how science is the result of the human spirit, it ‘demythologizes’ science, showing how it is not infallible but genuinely falls within history; but Hooykaas also draws the very reasonable conclusion that *we* ourselves are genuinely in history, and that there is no privileged point of view from which we can bestow praise or blame. He therefore admonishes historians of science not to divide our ancestors in black and white sheep – an admonition that stands opposite to Sarton’s division between reason and unreason.³⁰

Hooykaas has a clear view of what the divide between the sciences and the humanities that needs to be bridged is, and what it is not. It is not simply the difference between nature and history, since nature itself is historical in the sense that it is unique and non-repeatable, and there are clear regularities in human history as well.³¹ Nonetheless, he says that we need to be careful when we apply naturalistic language – for instance, that of Darwinistic evolution – to the humanities, for it is only in human history that we have a sympathetic relation to our research object.³² History of science precisely establishes this relation for science; and in doing so, it reminds the scientist to see his work as a part of human culture, and to see himself as the inheritor of a long tradition. “However much natural science strives after objectification and dehumanization, its history is, after all, part of a history of *human* thought and action.”³³

The perspective proposed in this thesis will turn out to resemble rather closely these formulations by Hooykaas. It is useful to think of history of science as a bridge, not between the unique and historical on the one hand and the universal and regular on the

²⁸ Hooykaas (1982, 154).

²⁹ Hooykaas (1982, 169 [my translation]). See also Hooykaas (1963, 7-8, 16-17).

³⁰ Hooykaas (1982, 163-164).

³¹ Hooykaas (1966).

³² Hooykaas (1982, 163).

³³ Hooykaas (1957, 409 [my translation]).

other (for such a bridge is neither possible nor necessary), and not primarily as a bridge between nature and human culture (for the object of history of science is an aspect of human culture as much as any subfield of history, which cannot be understood without its taking place in a natural environment); but as a mediator between current science and the history of which it is a part.

What could this mean for the mutual relations between science and history? The history of history of science in the past half century has to a large extent been one of conscious emancipation from the grip scientists were perceived to hold upon the agenda of the discipline. If in 1963, Bernard Cohen could, while denying that history of science was a bridge between the sciences and the arts,³⁴ confidently say that “obviously, scientific training is a necessary condition for studying the History of Science, as history is”,³⁵ Paul Forman argued in 1991 that historians of science ought to be radically independent of the science they studied. Their discipline needed to be genuinely intellectually autonomous in order to avoid ‘whiggery’.³⁶ It needed to operate under the notion of a fundamental difference between “‘us’ as historians and ‘them’ as scientists”.³⁷

This also brings us back to the role of nature in history: if we do not want the discipline to be at risk of losing authority over its final explanations to scientists – the ‘them’ it is supposed to study critically – perhaps we had better assume that the reality scientists try to talk about is not crucial to the course of science. As Forman puts it:

Only by thoroughly historicizing scientific knowledge - explaining possession of specific pieces or structures of it, not by appealing to a transcendent reality (whose mode of action in this world is no more than metaphorical), but by reference to mundane factors and human actors - can historians of science move away from whiggery and toward intellectual independence.³⁸

If we follow scientists in the idea that their mental products acquire some sort of history-transcendence, this prevents us from “adopting the critical attitude essential for an independent apprehension of the reality that science was and is”, Forman claims.³⁹

It is one aim of this thesis to analyze this intuition – that for history of science, the desired intellectual autonomy, the possibility for a critical study of science, and a downplaying of the role of the ‘reality’ on which scientists themselves claim their intellectual products are based, come as a package. I think they do not, and I find Forman’s plea for radical independence to be fundamentally wrong, but without thereby arguing in favor of the kind of history of science that he claims to oppose – the objections brought in

³⁴ Cohen (1963, 771-773).

³⁵ Cohen (1963, 775).

³⁶ Forman (1991, 87).

³⁷ Forman (1991, 71).

³⁸ Forman (1991, 78).

³⁹ Forman (1991, 85).

against Sarton's perspective on the history of science in the previous section are by and large the same as Forman's.

History of science is indeed a subfield of history, not of science; but in order to be able to feed back into our ideas of what science is, it must take into account these same ideas. This is the core of the perspective upon history of science that this thesis will argue for, which will be approached from the perspective of the role of nature in history of science.

1.5 Outline of this Thesis

This main question, about the explanatory role of nature in history of science, can be approached from two angles: on the one hand, it is a question about the objective role of nature in deciding the course of history of science; on the other, it is a question about whose nature we are actually discussing in this context, and about what the complications are in employing our own beliefs about nature in a historiography that is supposed to shed light precisely on why we have come to believe what we do. This thesis tries to deal with these two questions at once, and culminates in a statement about the role of nature in history of science that covers both aspects. Nonetheless, some chapters belong more or less clearly to one or the other side of the question.

Chapter 2 provides an analysis of a pair of concepts – contingentism and inevitabilism – that is relevant to understanding what is at stake in the causal question about the role of nature. We will define inevitabilism as the claim that the content of science is insensitive to those aspects of historical reality that could have been different.

Chapter 3 analyzes problems connected to 'Whig history' or presentism, and brings us into the debate on the legitimate and illegitimate uses of our own conceptions and beliefs about science and nature. The main problem turns out to be what we will call 'causal anachronism', a species of historical error consisting in the claim that something was the case that in fact could not have been the case. This is what is at stake in debates about presentism, but I will argue that there is no anti-presentist methodological shortcut which can help us to avoid errors of anachronism.

Chapter 4 investigates the relation between inevitabilism and the role of nature in history of science, by looking at possible non-contingent factors that drive the history of science. We conclude that nature itself cannot render inevitable the historical development of science, and that though it can conceivably do so in combination with a non-contingent, history-transcending rationality, such a 'normative inevitability thesis' does not support a causal inevitability thesis as defined in chapter 2 – though our canons of rationality can serve as a hermeneutic point of departure through which we understand past intellectual efforts. We will also see that what at first sight look like alternatives to nature-based inevitabilism – the idealism of Alexandre Koyré and the Marxist social inevitabilism of Boris Hessen and John Desmond Bernal – in fact rely on the idea that the structure of the world determines the content of science, and that according to these authors too, what science looks like in the end can be understood from what nature looks like.

At the other extreme we find the position that nature should not at all figure in our explanations of science, which we will discuss in chapter 5. We will discuss five arguments for this position: the argument from underdetermination; the argument that nature is a common factor that 'drops out'; the argument that society rather than nature provides us with our categories; the argument that historians should deal only with their own areas of competence; and finally, the constructivist argument that nature is in fact the result of social constructions, not its cause. All these arguments will be found wanting, though the question of competence can be turned into a question of circularity which we do not fully resolve in chapter 5.

Chapters 4 and 5 work with the assumption of a distinction between society and nature. In chapter 6, we discuss Bruno Latour's attempt to provide a vocabulary which overcomes the divide between these two. Latour's Actor Network Theory tries to undermine the idea that historical entities need to be related in some way to one unified and stable reality. Since not just concepts, but also their corresponding realities are historically constructed, using current ideas about nature to describe the past may be causally anachronistic in the sense defined in chapter 3. However, the problems with Latour's ontology regarding non-arbitrary addition of new actors to networks, the demarcation of networks, and the tracing of actor's ontologies, suggest that his arguments do not force us to throw away our inherited ontologies completely. Though dislodging the distinction between nature and society, Latour does not demonstrate that the question of the relation between science and nature ceases to be meaningful: a gap can remain between how we see the world and how we believe the actors we follow saw it.

In chapter 7, we look at naturalistic ways of dealing with the relation between science and its objects. Under a naturalistic perspective, nature figures in history of science through causally influencing science. Invisible hand mechanisms can potentially explain both why science is successful and why it does not need to transcend naturalistic explanation. We will focus on David Hull's evolutionary account of science. This turns out to have several virtues, notably its proposal to see science not as a kind, but as a historical individual: a lineage. This lineage evolves because of selection pressures, and it is these selection pressures that form the causal link between nature and science. However, we will also add a few caveats (consistent with some tendencies in Hull's work but not with all), namely that not only the selection of scientific theories, but also the ways in which they mutate, are dependent on cultural and social contexts; this means that in order to explain the content of scientific theories, knowledge of nature is never enough, but detailed understanding of the scientists in their historical context is needed.

This opens up the question of understanding, to which we turn in chapter 8. While chapter 7 dealt mainly with the causal aspect of our problem, chapter 8 also deals with its hermeneutic side – the question of the role of our inherited categories in our dealings with the history from which we inherited them. We can look at science as a tradition that develops in a path-dependent way and accumulates elements from both nature and society

or culture, in such a way that the causal influences of both cannot be disentangled in the result. This makes the role of the world in the development of science itself historically conditioned: it is dependent on the shape of the scientific culture of the age, which in turn is not an independent variable, but a result of a historical development in which the external world has continuously played its – ever history-dependent – part. The world is what the scientific tradition at any point interacts with, but this scientific tradition itself has been formed path-dependently by continuous interaction with the world.

This causal thesis has repercussions for the hermeneutic position of history of science and the way in which our beliefs about nature can figure in our historical explanations. When attempting to understand earlier stages of the scientific tradition, our point of entry is a stage in history that has absorbed a lot of previous interactions with nature, on which not just our particular scientific beliefs but also the very demarcation of scientific beliefs from other beliefs causally depend. Making our historiography independent of current scientific categories and beliefs would require reversing in thought the historical process that has led to these categories and beliefs, and even as an ideal this rests on a misjudgment of what historical understanding is. We will end by discussing (and rejecting) four objections to this hermeneuticist perspective on history of science.