

Historiography, Teleology, and Kuhn's Last Writings

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Abstract

The issue that immediately draws attention in Kuhn's posthumous book is his rehabilitation of Whig or 'old' historiography of science (OHS), after the attacks made against it since *Structure* and even in previous works. In the present article, I discuss this question in the context of the distinction I propose between teleology and Whig historiography. I sustain that teleological selection is not a characteristic of the OHS, but of historiography of science in general. The OHS is called Whig because it is *strictly* teleological, that is, it does not conceive the necessity, after teleological selection, of constructing a narrative based on the issues specific to the historical agents selected by it, as is the practice of the NHS. This perspective allows for a better understanding of the relations between the OHS and the NHS and I hope it can contribute to a qualification and a first assessment of the 'act of grace' that Kuhn grants to the OHS or Whig history.

1. Introduction: A role for the 'old' historiography of science

The aspect of Kuhn's latest book that attracts most attention from those, like me, who have written about what he calls the new historiography of science, especially in its relation to the 'old' historiography of science, can be summarized in the following note from *Plurality*:

The tension between these two sorts of history is not restricted to history of science. Herbert Butterfield, *The Whig Interpretation of History* (London: G. Bell, 1931), provides an elegant discussion of the general case. But those who, like Butterfield and me, inveigh repeatedly against Whig history have tended to overlook its constitutive role within the historical process. (Kuhn 2022, p. 116)

This “constitutive role” of Whig history or OHS¹ is more explicit in the text to which the note refers:

Recourse to historical examples has been standard in philosophy of science for many years: what distinguishes the new movement is not so much its recourse to such examples as the form it gives them. Both the old and [the] new forms are historical, and both have essential functions to which the epilogue of this book will return. But the functions served by the two kinds of history are different and fundamentally incompatible, and that difference calls forth correspondingly different accounts of both the nature and the authority of scientific knowledge. (Kuhn 2022, pp. 115-116)

Kuhn mentions an epilogue that he ended up not writing and therefore does not appear in Kuhn 2022, but the book’s editor, Bojana Mladenovic, in her introduction, refers us to the third and final of the “Shearman Lectures”, also published in the book.² On note 27 she highlights that “Kuhn was satisfied with the formulation he offered there. He said that the main point of the epilogue is ‘virtually liftable out of the last part of the Shearman Lectures’ (“Interviews with Tom Kuhn,” 65)” (Mladenovic 2022, pp. xviii and 277).

In *Structure* Kuhn had already referred to the importance of OHS or what he called the “textbook history” in the training of science students, but this is not the issue that concerns him in his latest book (see Kuhn 1970a, p. 140, and Kuhn 2022, p. 88). Right at the beginning of section 5 of the last of the Shearman Lectures, he formulates his new question in the following terms: “How can historical narratives bridge the gaps or ruptures that remain after lexical change? How, to put the point differently, can the past be transported to the present and incorporated in [to] present identity?” (Kuhn 2022, p. 86) .

¹ As already defined in the Abstract, throughout the article I use the expressions NHS and OHS to refer, respectively, to the new historiography of science and the ‘old’ historiography of science. Kuhn also refers to the second as “Whig history” and “textbook history”.

² There still lacks more analyzes or references to Kuhn’s book. In addition to Mladenovic’s text, it is worth highlighting the first reviews such as those by Kordahl, Mayoral, Shapin, and Tuboly, all published in 2023.

This question concerns historical development and Kuhn says it has two answers, “both inescapable, and mutually deeply inconsistent”.³ Such answers refer precisely to the NHS and the OHS. What matters here is that, at the end of section 5 (the core of his answer endorsed by the epilogue), he writes:

Somewhere here there lurks an aporia. The tools that a professional requires are products of history. And those who use them must see themselves as full-fledged participants in the historical process by which those tools were and will be developed. Like everyone else, their present identity requires an appropriate past, and that is provided by a sort of narrative which, at its not infrequent worst, simply attributes bits of current knowledge, items from current textbooks, to historical figures who are supposed to have discovered them, displacing ignorance or superstition in the process. The very inadequacies, factual and conceptual, of that approach make it a more effective source of the identity required for the successful practice of science. If they have been formed by a lie – which I do quite intend to suggest – it is a noble one. (Kuhn 2022, p. 88)

When it comes to Kuhn, curiously enough, this seems to be an unhistorical view of the issue, in the sense that he himself disregards the historical relationship between the two historiographies. But he tries to redeem himself in some way, when he says shortly afterwards, in the last paragraph of the “Shearman Lectures”:

I exaggerate, of course, but in these closing moments I could not do otherwise. The two narrative modes I have been describing are never found in pure form; to a greater or lesser extent, they always interpenetrate. But the cleavage between them is nonetheless real. In a more muted form, for example, it separates historians whose subject is their native land and those who study other nations or other cultures. It is the cleavage between those who need history to look back and those who need it to look ahead, and it will not be eliminated. Though it has emerged explicitly only in my closing remarks, concern with it has run through these lectures. Seeing no way to discharge that concern, I shall leave you with it. (Kuhn 2022, p. 89)

³ The question had already been formulated by Kuhn in section 4 of the third conference, as the second of two questions he had to answer about historical development. The first concerned how a lexicon could change and is not directly relevant here. The second question, arising from the first, he stated there as “given the problems of translatability that result from lexical change, what connections with the past are available to the present, [and] how can the past be part of present identity?” (Kuhn 2022, p. 83)

Since he left the question up to his listeners and now, by extension, to his readers, I, who had already been working on an issue related to this, will try to outline here a suggestion that can take into account Kuhn's intuition about the relevance of the OHS and, at the same time, the exaggeration of his position, reconized by himself. With this, I hope to be able to contribute for a better understanding of the relations between the OHS and the NHS, as well as for a qualification and a first assessment of the last-minute 'act of grace' that Kuhn grants to the OHS or Whig history.

2. Teleology and historiography of science

I had already read several texts, which could be considered classics, on criticism of Whig history, published, for the most part, in the 1970s and 1980s.⁴ But it was a personal difficulty that really drew my attention to the problem. I was thinking about the emergence of Kuhn's new historiography of science and found myself on the verge of practicing what seemed to me to be an old historiography of the new historiography... I had asked myself how the NHS had come about and naturally began looking for the authors who had contributed to it. In other words, inadvertently, I was granting myself a license in relation to the canonical norm of the NHS to promote the proper contextualization of each author, which would mean taking them into consideration in light of their own problems and not in terms of a possible contribution to the emergence of the NHS.

And the same, it seemed to me, had already happened to Kuhn himself in the episode that he recounts, among other places, in the autobiographical preface to *The Essential Tension* with respect to the relationship of seventeenth-century mechanics with predecessor theories. Searching for the origins of that theory, Kuhn went back to Aristotle's physics, guided by the following question: "How much about mechanics was known within the Aristotelian tradition, and how much was left for seventeenth-century scientists to discover?" (Kuhn 1977, p. xi). Knowing Newton's physics, his historical question was formulated in Newtonian terms and, in those terms, he expected an

⁴ I mainly refer to David Hull 1979 and Rupert Hall 1983. See also Mayr 1990.

answer.⁵ But, in Kuhn's case, we can say, the problem occurred in a pre-Kuhnian period and not, as in my case, more embarrassingly, already in an advanced post-Kuhnian period...

An article by Thomas Nickles reinforced my interest in investigating the subject. He writes:

...it is not unusual for a critic to bash "philosophy" and then immediately turn to other philosophers for inspiration (...). Not even the positivists are as terrible as they frequently are depicted by alleged historicists who commit the blatantly whiggish mistake of refusing to consider the positivists in their own problem and cultural contexts. In some of those contexts, after all, to adopt a favorable attitude toward science and scientists was to take a moral and political stance that was courageous and progressive. (Nickles 1995, pp. 149-150)⁶

And

R. A. Jones notes that antiwhigs are easily trapped by the reflexive exercise of providing a progressive history of the professionalization of their own discipline – a triumphant, Whig history of the victory of antiwhiggism, as it were. (Nickles 1995, p. 152. See also Jones 1983)

And, commenting on Schuster and Yeo 1986, Nickles says in a note:

Schuster and Yeo say that such conclusions [that there is no "single, transferable method responsible for the progress of scientific knowledge"] are based on historical evidence - another instance in which respected science studies experts appeal to history to evaluate methodological claims. They do point out that the traditional methodological project was blatantly whiggish but do not seem to notice that their own account of progress in the historiography of methodology is itself whiggish. (Nickles 1995, p. 159)

These flagrant instances of Whig behavior or unintentional whiggism show that my concern about the NHS is not an isolated case and raises a wider issue than one that could be resolved by simple self-criticism.

Kuhn writes that "scientists are not, of course, the only group that tends to see its discipline's past developing linearly toward its present vantage. The temptation to write

⁵ See also Melogno 2022 (section 2) on the way Kuhn sees the relations between *Structure* and *The Copernican Revolution* (1957), his previous book.

⁶ I tried to discuss positivism in its own context in Pinto de Oliveira 2020, 2021 and earlier texts.

history backward is both omnipresent and perennial” (Kuhn 1970a, p.138). But, perhaps, if it is not something deliberate as in the OHS, it is not just a mistake, a slip or inattention. This seems to be the intuition behind most texts on the subject. Presentism or a certain presentism seems to be inevitable in historical work.⁷

I will refer here to teleology and not presentism to account for the more general case, since a teleological process can be presentist or not.⁸ This opens up space for the inclusion of works that investigate the historical development of both contemporary science and ancient or modern science, asking, for example, how Copernican astronomy or classical mechanics emerged. And the same would apply to historical works that do not address scientific themes, as in the case of the French Revolution or the sixteenth-century Renaissance.

Teleology is present in the OHS and, at the same time, seems to be naturally absent from the NHS proposal. The NHS is understood precisely as a way of overcoming the problem of teleology or Whig history. Kuhn illustrates in *Structure* the switch from OHS to NHS, in well-known passages. Let us consider what he says about Galileo from the perspective of the OHS and the NHS:

Rather than seeking the permanent contributions of an older science to our present vantage, they [the new historians of science] attempt to display the historical integrity of that science in its own time. They ask, for example, not about the relation of Galileo’s views to those of modern science, but rather about the relationship between his views and those of his group, i.e., his teachers, contemporaries, and immediate successors in the sciences. (...) Seen through the works that result, works perhaps best exemplified in the writings of Alexandre Koyré, science does not seem altogether the same enterprise as the one discussed by writers in the older historiographic tradition. By implication, at least, these historical studies suggest the possibility of a new image of science. (Kuhn 1970a, p. 3. See also Kuhn 1970b, p. 68)

⁷ See e.g. Chang 2020, Wilson and Ashplant 1988, Loison 2016, Ivargonzales 2013 and Brush 1995.

⁸ Rupert Hall draws attention to the presentist aspect when he says that “How did we arrive at the condition we are now in?” is “the most obvious of all historical questions” (Rupert Hall 1983, p 54). In turn, Huizinga expresses himself more generally, giving way to a form of historical present: “When studying any period, we are always looking for the promise of what the next is to bring. Ever since Herodotus, and earlier still, the questions imposing themselves upon the mind have been concerned with the rise of families, nations, kingdoms, social forms, or ideas. So, in medieval history, we have been searching so diligently for the origins of modern culture, that at times it would seem as though what we call the Middle Ages had been little more than the prelude to the Renaissance” (Huizinga 1987, p. 7).

Galileo is given as a reference due to the book that Koyré dedicated to him (Koyré 1939), but also, of course, due to the perspective of the OHS that saw and evaluated Galileo based on his possible contribution to Newton's theory and to the construction of a concept of science, which identified with Newton's science. A science that, with Newton, as was believed, "once and for ever, solved the riddle of the universe" (Koyré 1965, p. 18). It can be said that OHS tells the story of the so-called Scientific Revolution as "the history of progress" (Koyré 1948, p. 134) or, as Kuhn said in *Structure*, the story of man's struggle against ignorance and superstition (Kuhn 1970a, pp. 1-2). In the same sense, Auguste Comte sees it as the story of overcoming the stages of religion and metaphysics, with emphasis on the episodes that contributed to the achievement of the scientific or positive stage, which he considered exclusive and definitive. (See Pinto de Oliveira 2020, p. 383).

In addition to Galileo, other authors naturally contributed to the so-called Scientific Revolution. In *L'universo-macchina*, Paolo Casini writes:

Newton, who was certainly not a pygmy, applied to himself, in a famous letter to Hooke in 1676, the old saying of a pygmy on the shoulders of giants. (...) The "giants" on whose back Newton perched are well-known: Galileo and Descartes, in physics and dynamics; Kepler, Borelli, Bulliaud, Flamsteed, Halley in astronomy and celestial mechanics; Cavalieri, Barrow, Wallis in calculus; Kepler, Grimaldi, Hooke and probably Barrow in optics; Boyle, Gassendi and Roberval in corpuscular philosophy (Casini 1969, p. 7, free translation).

But we must ask: How do we know these names? How was this selection processed? Let's take Voltaire as a reference, an author who can be considered one of the first historians of modern science (Casini 1983, pp. 97-99). He published the *Éléments de la philosophie de Newton* (1738) before the *Encyclopédie* and, therefore, any entry in it and D'Alembert's "Discours préliminaire". Galileo appears in the book, as do Descartes, Kepler and others, and we might want to know how Voltaire proceeds with the selection of authors who would have contributed to the extraordinary event he investigates, the conquest or emergence of Newton's theory.

The answer, or an answer, is that the basic selection is already present in the primary source, in Newton's *Principia* itself, as can easily be seen in the index of names offered by the critical edition by Alexandre Koyré and Bernard Cohen. There are

Copernicus, Cartesius, Galilaeus, Keplerus *et al* from the original Latin text (Newton 1972, vol. 2). It can be said that this outlines the answer to the important historiographical question of selecting the relevant authors. It is associated with the question of knowing, as Popper says, what science is and who should be called a scientist (Popper 1968, pp. 54-55).⁹

And we could say that, historically, it is based on the selection given by the OHS that, in turn, the NHS begins to investigate these authors on their own terms. And sophisticate the investigation. Following Butterfield's rule of "study the past for its own sake" only comes next, as the characteristic theoretical and methodological aspect of the NHS. Or, in Kuhn's words: one begins to ask "not about the relation of Galileo's views to those of modern science, but rather about the relationship between his views and those of his group, i.e., his teachers, contemporaries, and immediate successors in the sciences" (Kuhn 1970a, p.3).

And, from this point of view, the initial canon can be revised. New authors can be "canonized", just as mentioned authors can be excluded from the canon. As Bernard Cohen writes about Koyré:

A particular gift was the ability to call at will upon this vast store of information and to use it to show how a given topic was related at once to the main streams of ideas and to the little-known directions of thought. He taught us that to understand giants like Kepler, Galileo, Descartes, and Newton, we must also study carefully their lesser contemporaries: Hooke, Barrow, Roberval, Wallis, Hobbes, Seth Ward, Cavalieri, Riccioli, Gassendi, and even Bonamico. (Cohen 1966, p. 159)

Moreover, the very way Newton (as scientist and 'historian') sees his relationship with Galileo and other authors can be questioned. As Kuhn points out:

...Newton wrote that Galileo had discovered that the constant force of gravity produces a motion proportional to the square of the time. In fact, Galileo's kinematic theorem does take that form when embedded in the matrix of Newton's own dynamical concepts. But Galileo said nothing of the sort. His discussion of falling bodies rarely alludes to forces, much less to a uniform gravitational force that causes bodies to fall. By crediting to Galileo the answer to a question that Galileo's paradigms did not permit to be asked,

⁹ I take particular account here of the so-called internal history, without committing to the idea that it is independent of the so-called external history.

Newton's account hides the effect of a small but revolutionary reformulation in the questions that scientists asked about motion as well as in the answers they felt able to accept. But it is just this sort of change in the formulation of questions and answers that accounts, far more than novel empirical discoveries, for the transition from Aristotelian to Galilean and from Galilean to Newtonian dynamics. By disguising such changes, the textbook tendency to make the development of science linear hides a process that lies at the heart of the most significant episodes of scientific development. (Kuhn 1970a, pp.139-140. See also the example about Dalton)

What I want to emphasize is that the NHS was built on top of the OHS, taking as its starting point the object selection offered by the OHS. We can say that the NHS does not present itself as an ineffable inhabitant of Popper's World 3, autonomously placed on a shelf alongside other candidates for the position of *the* historiography of science, available 'plug and play' for the historian's practice.¹⁰ Instead, to understand the NHS it is necessary to locate it in its historical place, articulated with the OHS, taking it as a moment of structured reflection on the object. This essential aspect becomes clear if we ask ourselves how the NHS could independently fulfill its purpose of investigating the work of authors in relation to their own interests. This question would immediately lead us to a previous question: Which authors?

Historically, in any of its investigations, the OHS has carried out a teleological selection of relevant authors, as in the case of Newton and the emergence of classical mechanics. Then came the NHS, which, based on the selection given by OHS, built its investigation, taking into account the questions specific to these same authors. In a way, we could say that the NHS has developed a monographic work based on a more panoramic work by the OHS.

It should not be considered that the NHS is Whig just because it initially uses a teleological selection. In fact, the OHS is called Whig because it is *strictly* teleological, that is, it does not admit the need, after the initial teleological selection, to construct a narrative based on the questions specific to the historical agents selected by it. The OHS, in fact, due to its cumulative conception of scientific progress, does not contemplate this possibility. Kuhn says in *Structure*, comparing the two perspectives, that the OHS may leave the impression that

¹⁰ Kuhn himself, however, seems to suggest something like this when he refers to the NHS and OHS as "two sorts of history". See Kuhn 2022, p. 116, note 9, cited above)

science has reached its present state by a series of individual discoveries and inventions that, when gathered together, constitute the modern body of technical knowledge. From the beginning of the scientific enterprise, a textbook presentation implies, scientists have striven for the particular objectives that are embodied in today's paradigms. One by one, in a process often compared to the addition of bricks to a building, scientists have added another fact, concept, law, or theory to the body of information supplied in the contemporary science text (Kuhn 1970a, p. 140. See also pertinent passages from *Structure* first manuscript in Pinto de Oliveira 2017).

And this is exactly the image of science that inspires the OHS. An image that it assumes to be fully justified and, therefore, not open to change. According to this perspective, there is no need for 'deepening' in historical work or, at least, for an investigation of the questions specific to historical agents. If such questions are not the established questions according to the OHS image of science, they are considered irrelevant and attributed to the interference of external irrational factors. As Kuhn says in *Structure*: "More historical detail, whether of science's present or of its past, or more responsibility to the historical details that are presented, could only give artificial status to human idiosyncrasy, error, and confusion. Why dignify what science's best and most persistent efforts have made it possible to discard?" (Kuhn 1970a, p. 138).

This 'negative' or deviant story could be told, as Lakatos suggested, in footnotes. But Kuhn denies this conception, opening theoretical space precisely for the NHS. Following a passage, cited above, about the traditional image of science, he writes:

But that is not the way a science develops. Many of the puzzles of contemporary normal science did not exist until after the most recent scientific revolution. Very few of them can be traced back to the historic beginning of the science within which they now occur. Earlier generations pursued their own problems with their own instruments and their own canons of solution. (Kuhn 1970a, pp. 140-141)

There is a parallel there with the issue of cumulative progress, which can be enlightening. The fact that the history of normal science is cumulative does not make it a positivist, cumulative history. The OHS, on the one hand, and the NHS of normal periods, on the other, can be said to converge or overlap as a story of cumulative progress. But Kuhn seems to reject the idea that the OHS can be understood as the history or description of normal Newtonian science. Essentially, what Kuhn writes in

Structure about Einstein's and Newton's physics would apply to the relationship between the NHS and OHS (see Pinto de Oliveira 2020, section 3).

In this sense, Kuhn denies that the OHS would be a special case of the NHS, applying without further qualifications or reservations to the description of the cumulative progress observed in Newtonian normal science. According to Kuhn, the OHS conceives the progress of science as strictly cumulative and it needs to be transformed to apply to the normal period and only to it. And it is the NHS that sets these limits (Pinto de Oliveira 2020, pp. 387-388). In the same way we could say that the NHS imposes limits on the OHS with respect to object selection. The selection is teleological, insofar as authors are chosen based on their positive contribution to the later advent of a given theory, but it is not Whig. The selection is carried out with the explicit purpose of leading the work towards the investigation of historical agents' own questions, a subject considered irrelevant by the OHS.¹¹

3. The new historiography and teleology

So far, historically considering the relationship between the NHS and the OHS, we have highlighted the fact that the NHS uses the selection presented by the OHS. But, what if the investigation was on a new topic, not yet addressed from the OHS perspective? When approaching a topic such as the history of antiwhiggism, the history "of progress in the historiography of methodology" (as Nickles says about Shuster and Yeo) or the history of the NHS, as I try to do, the question that essentially formulates the investigation is "How did one get to X?" or "What happened that lead us to X?". Regarding the history of the NHS, we then proceed to a selection of authors who would have contributed to the development of the NHS.¹²

In this case, the historian would turn to Kuhn and *Structure*, justified by the fact that Kuhn explicitly refers to a "new historiography" of science in this book and it is precisely from this NHS that it would be intended that history was told. The book's

¹¹ The publication of texts from the symposium that brought together Nickles, Brush and others opens with photos of Butterfield and Sarton and the following caption: "How far can 'antiwhiggism' go? Admitting that one cannot be a pure antiwhig historian in Herbert Butterfield's sense does not mean that one can turn back the clock to George Sarton's vision of the field of history and philosophy of science" (Nickles 1995, p. 138).

¹² Here I continue to take into account, in particular, the so-called internal history. See note 9.

bibliography provides a starting point, as does the *Principia* bibliography for the path of how Newton's theory was arrived at. It points out or suggests possible names that would have contributed to the development of the NHS up to that point.

This could be done in relation to all the revolutions identified by Kuhn in the book or, in a paper, taking into account a particular revolution, such as the chemical revolution. Several authors, such as Maurice Daumas, Henry Guerlac, Andrew Meldrum and James Partington, are cited by Kuhn and the question arises as to how each one would have contributed to the emergence or development of the NHS, in particular, in relation to the so-called chemical revolution.¹³

This would be the first, legitimate step of the investigation and would not constitute "a triumphant, Whig history of the victory of antiwhiggism", to use Nickles' expression. The question and the first answer are teleological, perhaps necessarily teleological, marking the only possible way of offering a first selection of historical authors/agents pertinent to the investigation.¹⁴ But this does not characterize a Whig history because the investigations sponsored by the NHS do not end there. It is only a preliminary work, with an area of initial overlap with what would be Whig history, but which then deliberately extrapolates and denies it, and therefore should not be confused with it.

In other words: like the OHS, the NHS begins with a teleological question, in the form "How did we get to X?"¹⁵, whose answer projects X onto the past. This projection will direct the selection of the historical agents that would have contributed positively to the emergence of X. This will be the final result of the investigation via OHS and, in the case of the NHS practice, an investigation of the work of historical agents on their own

¹³ This is what Amelia J. Oliveira does in an ongoing article, in which she investigates what we could call the historiographical bibliography of *Structure*, focusing on the chemical revolution. She presents an exposition of chapter 11 of Butterfield's book (1949), which, in Kuhn's assessment, offers an old historiography's perspective of science on the chemical revolution. She then presents Kuhn's own conception of the same revolution, as a reference version of the new historiography of science, and then seeks to analyze the historiographical nuances of the bibliographical material cited by Kuhn, identifying traces of the new and old historiography of science present in these texts.

¹⁴ Based on what I defend here throughout the article, I believe that even the question is not Whig, in the sense of Stephen Brush and Paul Hoyningen-Huene (See Brush 1995, p. 220, and Hoyningen-Huene 2012, pp. 290-291).

¹⁵ It is the classic question of historical research, according to Rupert Hall (see note 8 above). Michael Kremer refers to a more ironic formulation: "Ivor Grattan-Guinness (1990, p. 157) has coined the phrase 'a royal road to me' for that kind of presentist history (of mathematics, in his case) which aims to provide an 'account of how a particular modern theory arose out of older theories instead of an account of those older theories in their own right,' thus confounding the questions 'How did we get here?' and 'What happened in the past?'" (Kremer 2013, p. 311).

terms will follow. An investigation that, in principle, could challenge the conclusions of the Whig perspective.¹⁶

On the other hand, it is worth remembering that Koyré wrote a panoramic work such as *From the Closed World to the Infinite Universe* (1957) after his main monographic works. In his very brief review of the book, Kuhn makes a point of mentioning the 17 “most fascinating figures” selected there by Koyré and does not fail to point out a certain disconnection between the method used and the breadth of the theme:

The lucid colloquial style which makes this book so pleasant to read often combines with the intrinsic limitations of exposition through quotation and commentary to disguise both the coherence and the significance of the topics treated. (...) It will take careful readers or ones with more than average background to isolate and follow the conceptual threads that make this volume an important contribution to the study of 17th-century thought. (Kuhn1958, p. 641)

Koyré, in turn, certainly inspired by Lovejoy 1936 (cited in the Introduction and in the first two chapters), highlights that the “story” he wants to tell takes “the history of cosmology, as Ariadne’s thread”. After the long paragraph in which he outlines what “the full and complete history” of the destruction of the Cosmos and the infinitization of the universe should take into account, he writes:

However, in spite of this tremendous number of elements, discoveries, theories and polemics that, in their interconnections, form the complex and moving background and sequel of the great revolution, the main line of the great debate, the main steps on the road which leads from the closed world to the infinite universe, stand out clearly in the works of a few great thinkers who, in deep understanding of its primary importance, have given their full attention to the fundamental problem of the structure of the world. It is *with them, and their works*, that we shall be concerned here, *all the more so as they present themselves to us in the form of a closely connected discussion* (Koyré 1957, p. 3, my emphasis).

What is directly important here is that certainly this panoramic view of Koyré, which follows “the main line of the great debate”, “the main steps on the road” or “Ariadne’s thread” does not correspond to the OHS or Whig history, which Kuhn says

¹⁶ In Pinto de Oliveira 2012, 2020 and 2022, I discuss the relations between the NHS and the OHS as well as the relevance of history in Kuhn's philosophy of science. See also Patton 2021 (pp. 42-44).

he himself previously denounced and even ridiculed (Kuhn 2022, p. 87). This is a historical perspective that we can continue to call panoramic, but on a second level, which takes into account the authors it investigates in their own terms, as Koyré makes clear.¹⁷

The reference to Ariadne's thread, made by Koyré as well as Kuhn in his last book (Kuhn 2022, p. 113), leads me to think again about the question of the thread or an evolutionary line. Kuhn makes a suggestive brief observation, when referring to the translation work of scientists in a time of crisis and of historians of science, when compared with the work of the translator. He writes: "They [the historians] often have the inestimable advantage that the signs used in the two languages are identical or nearly so, that most of them function the same way in both languages, and that, where function has changed, there are nevertheless informative reasons for retaining the same sign". And the same signs are maintained, although this identity can be misleading, creating false cognates or making it be "excessively easy to ignore functional changes that would be apparent if they had been accompanied by a change of sign" (Kuhn 2000, p. 165). I believe that these "informative reasons" concern the bond, the ascendancy-descendancy relation between theories, family traits or family resemblance between them, perhaps as important as Ariadne's thread in the labyrinth. The issue is discussed in Pinto de Oliveira 2011 (see especially pp. 229-30).

Perhaps the very notion of incommensurability tacitly indicates a sufficient link in intertheoretical relations in science since what Kuhn is interested in discussing as incommensurable is the relation between the theories of, say, Copernicus and Ptolemy, and not the trivial incommensurability in the case of Copernicus and Darwin's theories. Despite the ruptures, the theories of Copernicus and Ptolemy maintain something in common that those of Copernicus and Darwin do not have. It is not easy to define precisely what this common element is, but the same symbols present in the theories and the evolutionary line that marks the historical process of the movement towards the new theory help to make it effective. The difference between one situation and the other (one type of incommensurability and the other) perhaps already brings with it a guarantee that we have not lost the thread of the relations between scientific theories in the first case, no matter how deep is the rupture between them.

¹⁷ See also what he says about the notion of precursor in Koyré 1971, pp. 149-164.

By the way, it is necessary to take into account that the OHS often disqualifies earlier authors who do not align with the contemporary perspective and tells a shorter story. The past then also becomes less venerable. Kuhn reacts exactly against the idea that Aristotle knew nothing about physics and seemed to say nonsense things about it. He illustrates the case by referring to the fact that Aristotle was ridiculed by Descartes (Kuhn 1977, p. xiii). And this can be observed even recently, e.g., in the panoramic work of William Dampier.¹⁸ Although, according to Floris Cohen, George Sarton maintains a strictly cumulative approach, most Whig historians refer to Aristotle with the purpose of marking the rupture that gives rise to modern science known as the Scientific Revolution (Floris Cohen 1994, pp. 165-166).

4. Final comments

To conclude, it is worth remembering a famous quote by Gustave Flaubert: “It is the thread that makes the necklace, not the pearls”.¹⁹ It can be said that Kuhn initially drew attention to the pearls in his reflection on the historiography of science (the various scientific theories taken in themselves, in their own historical circumstances) and then, in his last writings, to the importance of the thread, that establishes a link between them. Flaubert’s phrase must have appeared in an antithetical context, since both the pearls and the thread are important in the necklace. And it’s not worth discussing which is more important or whether the necklace is essentially a thread, especially if we are talking about a pearl necklace.

But in a precise sense, which has been discussed here, I must endorse Flaubert’s phrase. I believe that in a classic historical question like “How did we get to X?” the thread comes first. I mean that, before a historical investigation is developed within the parameters of the OHS or the NHS, there comes a basic teleological approach common to the two alternative historiographies. This teleological approach selects which authors are relevant to the historical event or process that one wishes to study. After that, the

¹⁸ Kuhn speaks of “an almost continuous tradition from Condorcet and Comte to Dampier and Sarton” which “viewed scientific advance as the triumph of reason over primitive superstition, the unique example of humanity operating in its highest mode” (Kuhn 1977, p.148). But Kuhn’s criticism of Dampier is found mainly in his endorsement of Agassi’s 1963 criticism. See Kuhn 1966.

¹⁹ [Mais] les perles ne font pas le collier; c’est le fil. (Correspondance, 1852).

OHS will continue to be teleological, looking for new cumulative details about the contributions of these authors, characterizing a Whig historiography, while the NHS will turn to an investigation that takes into account, no longer and only the relationship of these authors with the historical event after them, but the integrity of their work from their perspective and in their own historical circumstances.

Summarizing the example we considered, the emergence of Newton's theory, we can say that, historically, the authors were selected in a teleological way, based on the role they had or would have had in the advent of this historical event. The OHS continued along this path and the NHS began a monographic, immanent investigation of each of the selected authors.²⁰

The theoretical scheme does not present any difference in relation to the other example considered here, the emergence of the NHS. It does not matter, therefore, whether we already have prior historical work guided by the OHS perspective, as in the case of Newton's theory, or whether it is a new topic and the work assumes the NHS perspective from the beginning. It all starts with a teleological approach, whether carried out by traditional historians (and the scientists themselves) or by the 'new historians'.

With this, I believe it can be said that Kuhn's concern, which led him to rehabilitate the OHS or the Whig history in his last works, seems to be absorbed in the practice of historiographical work itself. From the beginning there is a link between the object of investigation and the present, in the trivial sense that it is an issue that interests either the historian, the professional community to which they belong or society. In addition, and mainly, from a methodological point of view, there is a basic teleological perspective that selects and points out preliminary links between the object of study and the past. Such links could later be criticized and qualified by the NHS, without implying a complete rupture.

Thus, if the teleological aspect, which establishes a link among the work of scientists, is present in both OHS and NHS, as I argue, the rehabilitation of OHS could be unnecessary. The question is the strength and nature of this bond. Although Kuhn

²⁰ I use the word "immanent" here to distinguish the approaches of the NHS and OHS since the OHS also sponsored monographic works, such as Sarton's on Galen. Despite being monographic, his approach continues to view Galen's work essentially in terms of Harvey, who lived many centuries later.

does not talk about preserving the notion of cumulative progress nor does he use the expression, what he describes in the most explicit passage about rehabilitation of the OHS leaves little doubt about this purpose. He refers to a “sort of narrative which, at its not infrequent worst, simply attributes bits of current knowledge, items from current textbooks, to historical figures who are supposed to have discovered them, displacing ignorance or superstition in the process”. And he adds: “The very inadequacies, factual and conceptual, of that approach make it a more effective source of the identity required for the successful practice of science” (Kuhn 2022, p. 88. See all the passage, quoted at p. 2).

The link provided by teleological selection, as I present it here, begins in a way that contemplates the notion of cumulative progress. Afterwards, however, in the case of work carried out from the perspective of the NHS, the link tends to be weakened, to stop being cumulative. I could here appeal to the fact that Kuhn says he exaggerates when dealing with the rehabilitation of OHS. Thus, the more radical version could be set aside as exaggeration and I would preserve my interpretation. But Kuhn does not say what and where is the exaggeration. If Kuhn thinks of a strict cumulative progress and this is not the core of his admitted exaggeration, he would be asserting that the OHS – in addition to being important for the pedagogical aspect of science, as he wrote in *Structure* – is now understood as necessary for the success of scientific research itself.²¹

In this radical context, however, Kuhn’s Platonic “noble lie” insinuates a guardianship. It seems that the scientist needs to be somewhat deluded about what science is in order to practice it successfully. The more cautious idea that Kuhn had presented before still made perfect sense as it only referred to students and young scientists, whose training would include pedagogical strategies. But for those who have reached the ‘scientific majority’... Kant’s words about *Aufklärung* naturally resonate here.²² And, for us, who survived Kuhn and live in other times, the “noble lie” sounds uncomfortably like fake news. It is worth asking: history or story? (See e.g. Salmon 2008 and Brooks 2022).

²¹ Mladenovic, in his Editor’s Introduction to the book, suggests that the novelty of Kuhn’s later writings is that he comes to see the OHS “as indispensable *for all*, and not only for scientists” (Mladenovic 2022, p. 279, note 41). This interpretation, however, clashes with Kuhn’s clearest statement on the subject, which, as such, in a context of great imprecision, cannot be ignored. As we saw in the quote above, he writes that OHS is “a more effective source of the identity required for the successful *practice of science*” (Kuhn 2022, p. 88, my emphasis). See also Kordahl 2023.

²² See Kant 1996 [1784]. See also “On a supposed right to lie from philanthropy” (1797). Plato uses the expression in *The Republic*, Book III, in the context of politics.

Unfortunately, Kuhn had no opportunity to do more than announce the intention to rehabilitate the OHS, without due clarity and without a minimally developed justification. Strictly with regard to the questions we have considered here, within the scope of the historiography of science, Kuhn's posthumous and unfinished book is both stimulating and frustrating.²³ In the embryonic state in which his proposal finds itself, at least in what would be its most radical form, it cannot be taken into account to the detriment of what he has for years defended fully and consistently with his other ideas about science and history.

A link with the past is relevant to the practice of science, the notion that a scientist is part of a project that unfolds articulately over time. This articulation is not given by the notion of strict cumulative progress as understood by the OHS. It is complexly established, through processes that are not always logical and precise, which the NHS seeks to investigate with critical sense, as Kuhn himself 'Kuhnianly' recognizes. But the results of investigation, as it concerns the realm of knowledge, must apply both to the understanding of science and to its practice. Noblesse oblige.

Acknowledgements

I am grateful to Amelia Oliveira for her comments on an earlier draft of this paper. I would like to thank also Baruana Calado for comments, translations and revisions.

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²³ In Hoyningen-Huene 2015 (p. 191), the author writes about the long prehistory of the book's publication: "Shortly before his death in June 1996, Kuhn had asked two younger colleagues to edit the book manuscript and complement the missing chapters on the basis of his notes and his oral suggestions. One of the potential editors, John Haugeland, died in 2010. The other potential editor is James Conant. In the bygone 17 years until today (Sept 2013), Conant's homepage has been featuring Kuhn's *The Plurality of Worlds* as 'forthcoming'". And he adds in a note: "...over the years I asked Conant via email again and again when the book would be published but I was always promised jam tomorrow".

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