

## Old and Outdated Tales of the History of Science I: Internalism

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We come now to Section 7, which concludes this analysis. These four Chapters are about historiography, which means an analysis and discussion of the assumptions and theories which historians use in their work (descriptions, narratives, explanations). In other words, the assumptions about how the world works which are made in an historical explanation. Thus, the historiography of science is the analysis of the assumptions that the historians of science make.

In this Chapter we are going to deal with the two main traditions or schools of thought in the historiography of science which have been popular in this century. They are called Internalism, or Internalist History of Science, and Externalism, or Externalist History of Science. Any historical discussion implicitly involves some theory of explanation. In historiography we take out those theories of explanation and look at them critically in order to evaluate them. As we shall see this is important for several reasons. One reason is that academics who are professionally concerned with looking at science, have a stake in persuading their audience that they, and they alone know what 'science' is all about.

We have already seen several historiographic positions, for instance, Popper who tells us what science is etc; and Kuhn, whose whole position is an historiographical position or model which says that general science is a particular kind of animal and that it changes in this kind of way, and if you want to write about the history of science this is the framework you should use. Throughout, we have not dealt with issues as pure neutral description, rather we have been giving an explanation and interpretation of various historiographic approaches.

There is much academic debate about historiography of science. Science has become a very important social institution over the last couple of hundred years. Wherever there is a powerful institution in society, it becomes very important socially, and also politically, to claim to know what the 'institution' is all about, what it is like, and what it does. Take the Church as an example. As you know, during the Middle Ages when as an institution it was most powerful, the experts on the history of nature and structure of the Church were among the most important people in society. Anyone who, like the Pope, could claim to speak authoritatively about what Christian religion was, and how it should be organised, gained a great deal of social power.

Whenever an institution is powerful it is important to decide who is speaking the truth about the institution. For example, in the 16th century the Pope and the Catholics were challenged by the Protestants such as Luther and Calvin. What was really going on (other than people arguing about free-will and whether Christ was really present in the eucharist), was a struggle over religious authority. This was a society where religious belief was held in the highest regard. What the Pope, Luther, and Calvin were really arguing over was who had the right to speak in the name of genuine Christianity. This was the most potent and legitimate form of authority in the Middle Ages and Renaissance.

Today, in a similar way, science is a very important institution in our society and therefore, the struggle is to be able to say "I know what science is, but you do not", or "I

know what scientific progress is, but you do not” and so on. Defining the nature of science and understanding where it has come from, and where it’s going, isn’t just an abstract academic game. The struggle to convince other people that you are right about what science does is one of the most important things within our culture. If I can convince a lot of people that I know what science is, then I am in a special position of power and privilege in our culture.

This struggle began in the 18th century during the Enlightenment, when a long term trend began to develop, based on the optimistic judgement that with Newton science had come of age and begun to explain, and promise the domination of, nature. This trend identified science, especially Newtonian science, with socio-political reform and human progress. The new ‘Enlightenment’ world-view identified all reform as having science as its model and source of its growing power. People who took this view were saying Science was primary and Religion secondary. This same kind of thread runs through the 19th century. To oppose this scientific stance in the 19th century meant to place yourself somewhere to the right of middle-class liberals and within some reactionary realm, because science had been defined as ‘progressive’. Anyone of this persuasion tended to base their position on the claim that they were in touch with the nature of scientific ‘rationality’ and ‘objectivity’ and the nature and motors of scientific ‘progress’.

In the 20th century this kind of struggle to be able to speak for the various sciences has become much more problematical. People of various viewpoints have become worried about science, medicine, technology, or the environment. Issues about what science is and does, have become more problematic because a lot of people do not trust the 18th and 19th century definitions of science. In some people’s view, science has become the problem, posing as many problems as it solves. Science is no longer viewed simplistically as being good, objective, rational, and neutral. Today the argument is in a sense about the nature of science and technology. For example, in medical technology scientists say they can make babies in test-tubes -- and they do. But, there are other people asking what is the point of investing in this line of research as opposed to others. The advocates will say that it is important to go along with the ‘line of progress’. Its opponents say *that* is only one definition of progress, one which is costly and wasteful, even if it can be counted as ‘progress’ at all. This argument is about the meaning of medical progress. People are struggling to speak in the name of scientific authority.

Ultimately historiography of science is about these same issues and the debates, and is fueled by the same concerns. The classic positions, Internalist and Externalist, are not positions that professional historiographers count as important any more. These ideas have been outgrown. But, these positions still exist in wider society, especially in the media, in cultural commonplaces, and in policy-makers and politicians minds. These internalist/externalist positions get recycled and recycled. These two classic viewpoints have been at odds with each other since the 1930s on into the 70s.

Both positions share two things in common. (fig. 1a) They assume that Science has an ‘inside’ which is a technical, intellectual inside. They believe that Science, ‘the inside’, consists solely of intellectual contents; that is ideas, concepts, theories and methods which exclude social and economic things. And, both sides also assume that Science always takes place in some kind of social, political and economic environment, an ‘outside’. Even the most blinkered Internalist cannot deny that in every time and place Science is practiced within a larger context.

Given this common framework, this common grammar, the two sides then proceed to disagree totally: The Internalists believe that to understand the history of Science you **only have to look at the intellectual content inside** Science. (fig. 1b) They believe that the intellectual content of the Sciences develops through its own inner logic, and inner dynamics. It is not important or necessary to the internalist to study the social, political and economic context of Science because this does not enlighten us about the internal development of science. The Externalist position (fig. 1c) is to agree that Science is a set of intellectual achievements, but to also say that the history of Science cannot be understood unless you **constantly explain the inside by means of reference to the social, economic and political forces within which Science is embedded**. So granted their agreement about the 'inside', the Externalists go on to state the exact opposite of the Internalists on the issue of how the stuff 'inside' gets done.

I believe that these two positions existed in the 20th century History of Science for political and ideological reasons. The classic Externalists in our century were, with one exception, Marxists of one kind or another ie: Stalinists or middle-class western Marxists (such as J.D. Bernal), and others. Internalism, on the other hand as it developed in the 1930s to the 50s, is held together by a desire not to surrender to a Marxist history of science. Internalists differed among themselves but they all agreed that Externalists are wrong about the history of science. This contemporary political sub-plot will not be discussed when you read a book by Koyré or J.D. Bernal but even so, this is certainly what was actually going on.

The most famous Internalist of Science was Alexander Koyré, who died in 1964. Thomas Kuhn, a generation younger, thought that Koyré was an absolute hero and model in the historiography of science. Koyré was a Jewish-Russian emigre; he was a 'white Russian', who was anti-Soviet and anti-Marxist. He said that our perception and description of facts depends upon our prior conceptual framework. Koyré also said that there is no method that is used to produce Science. You cannot go out observe facts and generalise. He also believed that every scientific theory is embedded in a further set of deep assumptions which shape that theory. This set of deep background assumptions is called the metaphysical background to that theory. Koyré was one of the inventors of that idea. In all of that, I agree with Koyre, and we have been exposed here to Koyrean ideas, but it does not mean that I agree with everything Koyré was saying.

Koyre wanted to produce a historiography, a master narrative of how it all happened. In a couple of sentences this is Koyré's story: Modern science (by this he means Copernicus, Kepler, Newton) is not based on the discovery of a method. Modern science is based on all the people involved in that science suddenly adopting a new and different metaphysical background. What is this 'metaphysics'? It is the belief that nature is fundamentally mathematical and quantifiable. It is the type of idea embodied in what I have called Platonism and neo-Platonism in the Scientific Revolution. Koyré was working with an idea that there is one and only one metaphysics for modern science, this kind of watered-down Platonism. Koyré often writes that we should not be Whiggish, yet I feel that unconsciously Koyre was himself Whiggish. Koyré states that Aristotle was not ignorant but that he had the wrong metaphysics. You could not develop modern science with Aristotle's metaphysics for it is the 'wrong' one. Copernicus, Galileo, Kepler, Newton, they all stumbled upon the 'right' metaphysics and progressed. Thus, Koyré is like a Whiggish historian of metaphysics! I think it is difficult to state that one metaphysics is better than any other metaphysics. This is one of the places where I part company with Koyré. (fig. 2)

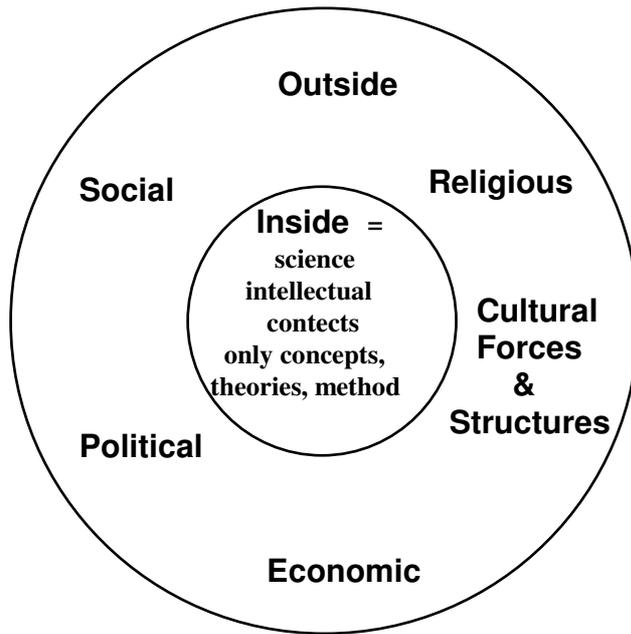
Notice also that Koyré's story is one of revolution and rupture; not a story of evolution and continuity. He believes this because there was a sudden revolutionary change in the 16th and 17th century, when a few scientists began working within this different metaphysical framework, which promoted the development of the new theories of physics and astronomy. Koyré does not want to explain that change externally, by social, political, economic or religious factors, because that is not important to him, and he apparently thought that all such explanation would aid and abet a marxist perspective. There are however, different kinds of Internalists who do not all agree with Koyré's ideas (There are other careers and reputations to be made). Why agree with Koyré when you can stake out a *new* claim for Internalism?

Let's examine a different version of Internalism, to show that different versions are possible. These other Internalists are still firmly against Externalism and Marxism. It comes from people like John Herman Randall who was a historian of philosophy at Columbia University and A. C. Crombie, an Australian who has worked at Oxford for over 40 years. Crombie and Randall offer a form of Internalism which says that the key to science is not metaphysics but 'Scientific Method'. [Does this sound familiar?] These men believe that the essence of science is 'method'. The idea of method, in their view has been developing since Aristotle, was worked on in the Medieval universities by the Scholastics, and was then refined and discussed down through to the 17th century, when Galileo, Newton, and other people, put the final finishing touches onto scientific method. To use a metaphor: Scientific Method is a cake which has been baking for a long time. In the 17th century people put the icing on the cake. This 'icing' consisted of experiment and mathematics, but basically scientific method had been slowly 'cooking' over the past 2000 years. This kind of story obviously states that the history of science is one of slow and continuous development and this offered great comfort to Catholic Internalists and other people who were disturbed about the Galileo affair. and wanted to reinstate the importance of the Middle Ages and of the Catholic Church in the long history of slow scientific growth. (fig. 3)

We can begin to make a map of these people (fig. 4) on one axis we have Internalism and Externalism as basic approaches, and on the other axis the choice of revolution vs evolution in the process of scientific change. With Revolutionary Internalism we can put Koyré; with an Evolutionary Internalism we can put Randall and Crombie.

I can foreshadow where the Externalists will end up. By and large they were Marxists and so their story is going to be: modern science is the child of the transformation from Medieval feudalism to the early capitalist world. Therefore, modern science is a fairly recent invention which occurred within a sudden revolutionary rupture, caused by the social and economic transformation of Europe in the 16th and 17th century. So externalists tend to reside in the quadrant of Revolution and Externalism. Whether there are, or could be, evolutionary externalists is a nice question--perhaps we will wind up approaching that sort of position--but in a careful, internalist-influenced way!....

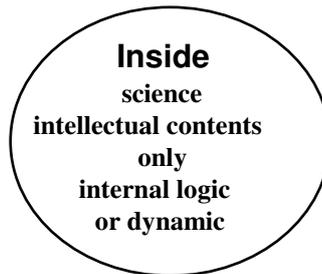
**Figure 1a**



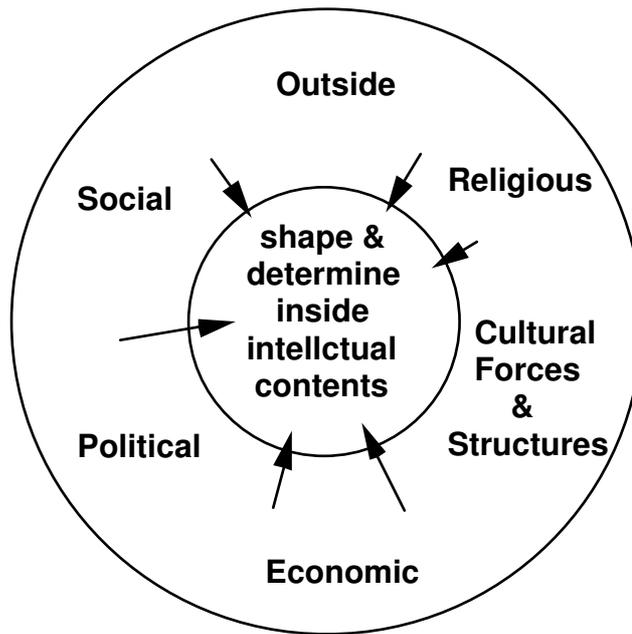
**Internalists & Externalists  
share the same  
'deep grammar'  
of debate**

**Figure 1b**

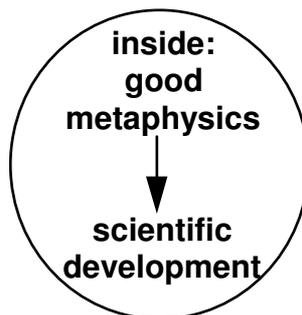
**Internalists:  
outside not relevant,  
except as an obstacle**



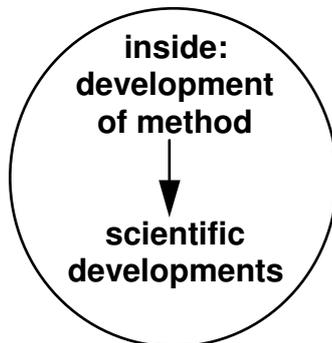
**Figure 1c EXTERNALISTS**



**Figure 2 Koyre's Internalism**



**Figure 3 Crombie, Randall, Internalism**



**Figure 4**

	<b>Internalist</b>	<b>Externalist</b>
<b>revolution &amp; rupture</b>	<b>Koyré</b>	<b>Bernal Hessen</b>
<b>evolution &amp; continuity</b>	<b>Crombie Randall</b>	<b>???</b>