Science, History and Ideology in Gramsci's *Prison Notebooks*

Francesca Antonini[*]

Abstract

Antonio Gramsci (1891–1937) made his notes on science within his *Quaderni del carcere* (*Prison Notebooks*) written between 1929 and 1935, while imprisoned by the Italian fascist regime. This overview focuses mainly on three themes: 1) the Gramscian criticism of the idealist (Croce) and materialist (Bukharin) conceptions of science and, in particular, his criticism of the alleged "objectivity of reality"; 2) the historical and ideological nature of scientific knowledge and the relationship between history of science and history of technology; 3) the interrelation between science, politics and society in the framework of Gramsci's "philosophy of praxis".

Keywords: Antonio Gramsci, science, technology, ideology, absolute historicism.

Science and historical materialism in the *Prison Notebooks*

The nature of science and its role within society are topics that Antonio Gramsci (1891–1937) did not develop systematically, although he devotes several notes to them:[1] the majority of these, in their "final" version, are collected in notebook 11 (especially in the third and in the fourth sections, entitled respectively *La scienza e le ideologie scientifiche* (Science and scientific ideologies) and *Gli strumenti logici del pensiero* (The logical instruments of thought), but also other notebooks contain reflections on issues (more or less) related to the epistemological dimension of scientific knowledge.[2] This theme remained at the margins of the investigation of Gramscian

* PhD Candidate in History of Philosophy at the University of Pavia, Italy.

[1] As is known, however, the unsystematic character is a typical feature of the *Quaderni* as a whole. From a general point of view on the *Prison Notebooks*, see Gianni Francioni, *Come lavorava Gramsci*, in Antonio Gramsci, *Quaderni del carcere. Edizione anastatica dei manoscritti*, vol. 1 (Cagliari: Istituto dell'Enciclopedia Italiana-L'Unione Sarda, 2009), pp. 21-60; on the new critical edition (forthcoming) and on the new chronology see Cospito, Giuseppe, "Verso l'edizione critica e integrale dei *Quaderni del carcere*", *Studi Storici*, 2011, 4: 881-904.

[2] On Notebook 11 see in particular Fabio Frosini and Gianni Francioni, *Nota introduttiva al Quaderno 11 (1932)*, in Gramsci, *Edizione anastatica*, vol. 15, pp. 1-22.

philosophy and only in recent years has been given some attention.[3] Even if Gramsci's observations on scientific knowledge do not have a systematic character, they can provide useful hints for the present-day debate about the history of science.

In the *Prison Notebooks* several core concepts of politics and philosophy are defined.[4] As for science, the most meaningful definitions are contained in Q 11, § 15 and in Q 11, § 37. In Q 11, § 37 Gramsci shows his intention to "bring together the principal definitions that have been given of science", and in particular he recalls the positivistic definition of science as research of the constants in the relationships between phenomena in order to forecast future developments.[5]

In Q 11, § 15, however, his approach is critical of the extension of this expectation to history: he says that "situating the problem as a search for laws and for constant, regular and

[3] After the pioneering studies by Aloisi, Rossi and Lefons (Aloisi, Massimo, "Gramsci, la scienza e la natura come storia", *Società*, 1950, 3: 106-110; Aloisi, Massimo, "Scienza, natura e storia in Gramsci", *Società*, 1951, 1: 95-110; Rossi, Paolo, "Antonio Gramsci sulla scienza moderna", *Critica Marxista*, 1976, 2: 41-60; Lefons, Chiara, "Scienza, tecnica e organizzazione del lavoro in Gramsci", *Critica Marxista*, 1978, 4: 103-132) the topic was neglected for a long time. A first renewal of interest took place in the late 1980s and in the middle of the 1990s: Silvano Tagliagambe, *Gramsci, Bucharin e il materialismo dialettico sovietico*, in *La questione meridionale. Atti del convegno di studi di Cagliari, 23-24 ottobre 1987* (Cagliari: Edizioni del consiglio regionale della Sardegna, 1988), pp 220-254; Derek Boothman, *Gramsci, Croce e la scienza*, in Ruggero Giacomini, Domenico Losurdo and Michele Martelli (eds) *Gramsci e l'Italia* (Napoli: La Città del Sole, 1994), pp. 165-186; Derek Boothman, *General introduction*, in Antonio Gramsci, *Further Selections from the Prison Notebooks* (London: Lawrence & Wishart, 1995), pp. VII-LXXXVII, partially translated in Boothman, Derek, "Scienza e traducibilità nei *Quaderni* di Gramsci", *Critica Marxista*, 1995, 2: 47-55. But especially in the last few years many critics dealt with the theme: Giuseppe Cospito, *Il marxismo sovietico e Engels. Il problema della scienza nel Quaderno 11*, in Francesco Giasi (ed), *Gramsci nel suo tempo* (Roma: Carocci, 2008), pp. 747-765; Derek Boothman, *Scienza*, in Guido Liguori and Pasquale Voza (eds), *Dizionario gramsciano: 1926-1937*, (Roma: Carocci, 2009), pp 746-749; Omodeo, Pietro Daniel, "La via gramsciana alla scienza", *Historia Magistra*, 2010, 4: 53-68; Nieto-Galan, Agustí, "Antonio Gramsci Revisited: Historians of Science, Intellectuals, and the Struggle for Hegemony", *History of Science*, 2011, 49: 453–478; Voza, Pasquale, "La critica di ciò che è 'oggettivo'. Appunti su scienza e tecnica in Gramsci", *Critica Marxista*, 2013, 6: 45-54. Particularly remarkable are also the proceedings of the conference organised by the Istituto Gramsci of Friuli-Venezia Giulia, entirely devoted to the Gramscian conception of science, Marina Paladini Musitelli (ed), *Gramsci e la scienza. Storicità e attualità delle note gramsciane sulla scienza*, (Trieste: Istituto Gramsci del Friuli-Venezia Giulia, 2008) with the following contributions: Silvano Tagliagambe, *Gramsci, la modernità e la scienza*, pp. 17-42; Pietro Greco, *Antonio Gramsci e i quanti*, pp. 43-62; Giuseppe Cospito, *Gli strumenti logici del pensiero: Gramsci e Russell*, pp. 63-80; Andrea Catone, *Gramsci, Bucharin e la scienza*, pp. 81-108; Antonio Di Meo, *L'"oggettività del reale": riflessioni gramsciane su scienza e neotomismo fra programma nazionale e cosmopolitismo*, pp. 109-146. For a review of the volume see Baratta, Giorgio, "Gramsci e la scienza", *Critica Marxista*, 2009, 2: 76-77. On the unsystematic character of the Gramscian reflections on science see Lefons, "Scienza, tecnica, lavoro", p. 108; despite the lack of method of the *Quaderni*, however, it is excessive to deny *tout court* the existence of some coherent theoretical framework, as Lefons sometimes does.

[4] In my paper I quote always from the Italian critical edition by Valentino Gerratana (Antonio Gramsci, *Quaderni del carcere*, 4 voll. (Torino: Einaudi, 1975)); in the following pages I indicate it only with the number of the notebook (Q), that of the paragraph (§) and, if necessary, that of the page(s). I refer mainly to Notebook 11; only on a few occasions do I mention the first version of the texts in parenthesis (for the sake of brevity I omit dealing here with the philological problem of the differences between the first and second versions of the notes). As to the translation, I quote the following English editions: Antonio Gramsci, *Selection from the Prison Notebooks*, edited by Quintin Hoare and Geoffrey Nowell Smith (New York: International Publishers, 1971 – I use the electronic reprint (London: ElecBook 1999)), henceforth SPN; Antonio Gramsci, *Further Selections from the Prison Notebooks*, edited by Derek Boothman (Minneapolis: Minnesota University Press, 1995), henceforth FS. When the English version is not available, the translation is mine, unless otherwise indicated.

[5] Q 11, § 37, p. 1455. FS, p. 290: "Bring together the principal definitions that have been given of science (in the sense of natural science). 'Study of phenomena and of their laws of similarity (regularity), coexistence (coordination), succession (causality)'. Other tendencies, taking into account the most convenient order that science establishes between phenomena, in such a way so as to be better able to master them through thought and dominate them for the purposes of action, define science as the 'the most economic description of reality'".

uniform lines is connected to a need, conceived in a somewhat puerile and ingenuous way, to resolve in a peremptory fashion the practical problem of the predictability of historical events".[6] Furthermore, by recalling the authority of Marx, he warns against the application of the scientific model of forecast beyond natural regularities. Scientific prediction, in the historical and political context, is not a pure theoretical and abstract activity, but a highly practical one and requires voluntarism and concrete effort:[7]

> Since it "appears", by a strange inversion of the perspectives, that the natural sciences provide us with the ability to foresee the evolution of natural processes, historical methodology is "scientifically" conceived only if, and in so far as, it permits one "abstractly" to foresee the future of society. Hence the search for essential causes, indeed for the "first cause", for the "cause of causes". But the *Theses on Feuerbach* had already criticized in advance this simplistic conception. In reality one can "scientifically" foresee only the struggle, but not the concrete moments of the struggle, which cannot but be the results of opposing forces in continuous movement, which are never reducible to fixed quantities since within them quantity is continually becoming quality. In reality one can "foresee" to the extent that one acts, to the extent that one applies a voluntary effort and therefore contributes concretely to creating the result "foreseen". Prediction reveals itself thus not as a scientific act of knowledge, but as the abstract expression of the effort made, the practical way of creating a collective will.

As clearly stands out from these observations, Gramsci's position on scientific knowledge is definitely not so straightforward: he is aware of the practical and theoretical relevance (and of the difficulty) of the issue and he intends to deepen it by rejecting its "mistakes" and, at the same time, by highlighting its positive and progressive aspects. Gramsci's aim is to contextualise this topic within the framework of historical materialism. In other words, his analysis of science is at the crossroads of different crucial aspects of his thought. Consequently, although not systematic, his investigation on the nature and role of the scientific knowledge is of absolute interest.

To account for this complexity, I shall start by identifying the polemical targets of Gramsci and show what is mistakenly attributed to science according to his opinion. After the *pars destruens*, I will concentrate on the *pars construens*, namely on the far-reaching connection

[6] Q 11, § 15, p. 1403; SPN, p. 796.

[7] Q 11, § 15, pp. 1403-1404; SPN, pp. 796-797. On the issue of the forecast in Gramsci's thought see Mancina, Claudia, "Rapporti di forza e previsione. Il gioco della storia secondo Gramsci", *Critica Marxista*, 1980, 5: 41-54 and De Giovanni, Biagio, "Il 'moderno Principe' tra politica e tecnica", *Critica Marxista*, 1981, 3: 51-79; with special regard to its reflection on science see Lefons, "Scienza, tecnica, lavoro", pp. 114-115.

between the Gramscian conception of science, his "absolute historicism" and his "philosophy of praxis".[8]

Against Croce and Bukharin

In his notes on science Gramsci refers more or less explicitly to two polemical targets. The first one is represented by the idealism of the leading Italian philosopher Benedetto Croce – this is, more generally, one of the most important points of (critical) reference of Gramscian philosophy.[9]

If, on the one hand, he agrees with Crocean criticism against the blind faith in science and scientific development of their contemporaries, on the other hand he finds Croce's conception of science clearly reductive, insofar as it considers natural sciences as "composed of empirical concepts (which are not true knowledge)".[10] As explained by Derek Boothman, in Croce's philosophy "the existence of the object becomes a 'position', that is to say, something opposed to the spirit, or given to the spirit"; in other words, "nature is reduced to a construction of the spirit" and the scientific knowledge is constituted by "pseudo-concepts [pseudo-concetti]".[11] The logical consequence of this strongly relativistic position is the reduction of science to a collection of "classifications of facts [classificazioni di fatti]".[12]

However, this statement has a paradoxical outcome; while it denies the autonomy of scientific thought, Croce's conception of science turns out to be very similar to the positivistic one he is questioning. In fact, according to Gramsci, an effective scientific theory cannot be constructed starting from a simple collection of facts (as positivists – and also Croce – tried to do), since it requires a meta-factual concept that joins them; not by chance, in Q 11, § 45 does Gramsci mention the "abstract 'classification'" as an example of the "philosophical Esperantism

[8] These aspects (and in particular the connection between science and Gramsci's absolute historicism) have not been thoroughly investigated, despite the growing interest for the Gramscian reflections on science: my aim then is to shed some light on them.

[9] Benedetto Croce (1866-1952) was an Italian neo-idealist philosopher who was one of the main intellectual figures of the interwar period (and also before) and the discussion of his thought plays a big role within the Gramscian reflection. The literature on Gramsci and Croce is huge; for a general overview on the question see Fabio Frosini, *Il neoidealismo italiano e la filosofia della praxis*, in Giasi, *Gramsci nel suo tempo*, pp. 727-746 and more recently Fabio Frosini, *La religione dell'uomo moderno. Politica e verità nei* Quaderni del carcere *di Antonio Gramsci* (Roma: Carocci 2010).

[10] Benedetto Croce, *Logic as the Science of the Pure Concept*, translated by Douglas Ainslie (London: MacMillan, 1917), p. 332.

[11] Boothman, "Gramsci, Croce", pp. 172-173 (but see also pp. 174-176). On Croce's conception of science see also Zappoli, Stefano, "Benedetto Croce's Theory of Science", *Logic and Philosophy of Science*, 2011, 1: 531-537.

[12] Croce, *Logic*, p. 333.

[...] especially rooted in positivist and naturalistic conceptions".[13] Moreover, the mere instrumental character of this conception hinders any investigation of the epistemological value of science and prevents from any serious consideration of the role of the scientists within the intellectual community (they are marginalised by "humanistic" intellectuals as Croce and Gentile).[14]

The second target of Gramsci's criticism is represented by the positivistic approach that underlies the Soviet Marxism embodied in Bukharin's *Popular Manual*.[15] The literature on Gramsci's criticism against Bukharin is huge and cannot be summarised here.[16] However, it is a fact that the Gramscian critique of his conception of science plays an important role within his more general reflection on Bukharin. Notebook 11 – that is the one that contains most of the notes on scientific knowledge – is usually conceived as the "Anti-Bukharin"; its second section is entitled *Osservazioni e note critiche su un tentativo di "Saggio popolare di sociologia"* (Observations and critical notes on an attempt of "Popular Manual of Sociology") and collects the texts on Bukharin contained in the three series of the miscellaneous notebooks *Materialismo e idealismo* (Materialism and idealism).[17] Furthermore, Gramsci had at his disposal also the book *Science at the Cross Roads*, which contains the papers of the Russian delegation at the International Congress of History of Science and Technology that took place in 1931 in London (Bukharin was the head of the delegation and his introductory speech, *Theory and Practice From The Standpoint of Dialectical Materialism*, represents a meaningful sample of his idea of the relationship between Marxism and science).[18]

[13] Q 11, § 45, p. 1476; FS, pp. 303-4. See Q 17, § 23, p. 1926; FS, pp. 283-284: "The investigation of a series of facts to find the relationships between them presupposes a 'concept' that allows one to distinguish that series from other possible ones: how does the choice of the facts to be adduced as proof of the truth of one's assumption come about, if the criterion of choice is not already in existence? But what will this criterion of choice be, if it is not something that is a higher level that each individual fact investigated? [...] (This observation is to be linked to the other on the 'sociological law' by which one does nothing other than repeat the same fact twice, the first time as a fact, the second as a law – this is sophism of the double fact, not a law". On this issue see also Boothman, "Gramsci, Croce", p. 174.

[14] See Q 14, § 38; FS, pp. 439-40. See Cospito, *Il marxismo sovietico e Engels*, p. 750.

[15] *Manuale popolare* (*Popular Manual*) is the name usually given by Gramsci to the famous book by Nikolai Bukharin *Historical Materialism. A System of Sociology* (London: International Publishers, 1925 - first published in Moscow in 1921).

[16] Nikolai Ivanovich Bukharin (1888-1938) was a Bolshevik politician, usually considered as the head of the "right" wing of the Russian Communist Party. After having initially supported Stalin's positions (1926-1929), from the end of the 1920s Bukharin fell into his disfavour, and was executed in 1938. As a theoretician, he was the representative of a deterministic and vulgar conception of the historical materialism that Gramsci strongly opposes in the *Prison Notebooks*. For an introduction to the question see Valentino Gerratana, *Introduzione*, in Nikolai Bukharin, *Teoria del materialism storico* (Italian version) (Firenze: La Nuova Italia, 1977), pp. V-XXXVII and, more recently, the entry *Bukharin* by Fabio Frosini in Liguori-Voza, *Dizionario gramsciano*, pp. 85-88.

[17] See Cospito, *Il marxismo sovietico e Engels*, pp. 752-754 and Omodeo, "La via gramsciana", p. 63.

[18] Nikolai I. Bukharin, *Science at the Cross Roads. Papers from the Second International Congress of the History of Science and Technology* (London: Kniga, 1931). See also the edition with a preface by Joseph Needham and an introduction by Paul G.

In brief, Bukharin understands scientific knowledge as a blueprint for historical materialism, which appears therefore to Gramsci as a "sociology", i.e., as a kind of new, naïf metaphysics:[19]

> The philosophy implicit in the *Popular Manual* could be called a positivistic Aristotelianism, an adaptation of formal logic to the methods of physical and natural science. The historical dialectic is replaced by the law of causality and the search for regularity, normality and uniformity. […] If "speculative idealism" is the science of categories and of the *a priori* synthesis of the spirit, i.e. a form of anti-historicist abstraction, the philosophy implicit in the *Popular Manual* is idealism upside down, in the sense that the speculative categories are replaced by empirical concepts and classifications which are no less abstract and antihistorical.

This "vulgar", materialistic interpretation of Marxism, which was influenced by different elements, last but not least by Engel's *Antidühring*, has strong implications: a firm deterministic view of the historical evolution and, above all, a "scientific objectivism" that is mirrored in Bukharin's strong belief in the objectivity of the scientific knowledge.[20]

Thus, the position of Croce and that of Bukharin are opposite but assimilable insofar as they promote a a-historical and a-critical conception of science, which is heavily stigmatized by Gramsci.[21]

The alleged "objectivity of reality"

First of all, Gramsci aims at dispelling the myth of the "universality" of the scientific method. In contrast to the assertion that science represents "'the most economic description of reality'",[22] apt to describe the similarities and the relationships between phenomena, Gramsci highlights the limits of scientific knowledge: he does not allow a generalisation of the scientific approach (if

Werskey (London: Frank Cass, 1971), which has recently been reprinted (New York: Routledge, 2013). See Omodeo, "La via gramsciana", pp. 64-65 and Catone, *Gramsci, Bucharin*, pp. 81-85.

[19] Q 11, § 14, pp. 1402-1403; SPN, pp. 795-796.

[20] See Q 11, § 32; SPN, pp. 606-607. See Cospito, *Il marxismo sovietico e Engels*, p. 760.

[21] See Q 11, § 64, p. 1492. Here he is discussing an article from the Jesuit journal *Civiltà Cattolica*: "for Catholics '... the whole theory of idealism is based on the denial of the objectivity of all our knowledge and on the idealistic monism of 'Spirit' (a monism which, as such, is equivalent to the positivistic monism of 'Matter')" (SPN, p. 699). In this context he reaffirms that both approaches are wrong and argues that the correct "monism" is an "identity of contraries in the concrete historical act, that is in human activity (history-spirit) in the concrete, indissolubly connected with a certain organised (historicised) 'matter' and with the transformed nature of man. Philosophy of the act (praxis, development), but not of the 'pure' act but rather of the real 'impure' act, in the most profane and worldly sense of the word" (SPN, pp. 699-700). On the interpretation of this equivalence between Croce's idealism and Bukharin's materialism see Frosini, *La religione dell'uomo moderno*, pp. 65-66.

[22] Q 11, § 37, p. 1455; FS, p. 290.

"scientific" is not simply a synonym of "rational" or "'in conformity with the end'")[23] and claims the dignity and the methodological autonomy of every single discipline: "every research has its own specific method and constructs its own specific science, and that the method has developed and been elaborated together with the development and elaboration of this specific research and science and forms with them a single whole".[24]

Gramsci's critique against the universal applicability of scientific method is counterbalanced by the confutation of the alleged "objectivity of reality", which constitutes the basis of the authority of scientific knowledge.[25] This issue plays a central role in the Gramscian analysis of science; it is the theme of many notes of Notebook 11, which recover notes contained in miscellaneous Notebooks 4 and 7.[26] As he affirms in Q 11, § 37,[27]

> the most important question to be resolved about the concept of science is this: whether science can give us, and if so in what way, the "certainty" of the objective existence of so-called external reality. [...] One may maintain it is an error to ask of science as such the proof of the objectivity of reality, since this objectivity is a conception of the world, a philosophy and thus cannot be a scientific datum. Science makes a selection of sensations, the primordial elements of knowledge: it considers certain sensations as transitory, as apparent, as fallacious because they depend on special individual conditions and certain others as lasting, as permanent, as superior to those special conditions. [...] One thus establishes what is common to everyone, what everyone can control in the same way, one independently from another, as long as each has observed to an equal degree the technical conditions of ascertainment. "Objective" means this and only this: that one asserts to be objective, to be objective reality, that reality which is ascertained by all, which is independent of any merely particular or group standpoint. But, basically, this too is a particular conception of the world, when taken in its entirety, can be accepted by the philosophy of praxis because of the direction it indicates.

[23] Q 6, § 180, p. 826; FS, p. 282.

[24] Q 11, § 15, p. 1404. SPN, pp. 796-797. See also the already mentioned Q 6, § 180, p. 826; FS, pp. 281-2: "The ambiguity about the terms 'science' and 'scientific' stems from the fact that they took on this meaning from a certain group of sciences, that natural and scientific sciences to be precise. Any method that was similar to the method of research and investigation current in the natural sciences – which became the sciences *par excellence*, science-as-fetish – was called 'scientific'. There do not exist sciences *par excellence* and there does not exist a method *par excellence*, 'a method in itself'. Every type of scientific research creates an appropriate method for itself, its own logic, the generality and universality of which consist solely in being 'in conformity to the end'".

[25] Almost all the scholars who dealt with this issue have recognised its crucial character for the comprehension of the Gramscian conception of science, but see in particular Voza, "La critica di ciò che è 'oggettivo'" and Di Meo, *L'"oggettività del reale"*, pp. 133 ff. See moreover Frosini, *La religione dell'uomo moderno,* pp. 67-80.

[26] See especially Q 4, § 41 (→ Q 11, § 37); Q 4, § 37 (→ Q 11, § 64); Q 4, § 43 (→ Q 11, § 34); Q 7, § 25 (→ Q 11, § 20); Q 7, § 47 (→ Q 11, § 17).

[27] Q 11, § 37, pp. 1455-1456; FS, pp. 290-1.

In Gramsci's view, "objective" is equivalent to "intersubjectively shared", or, as Cospito wrote, "humanly 'subjective' [umanamente 'soggettivo']".[28] As Gramsci wrote shortly after the aforementioned passage,[29]

> in science, too, to seek reality outside of humanity, understood in a religious or metaphorical sense, seems nothing other than paradoxical. Without humanity what would the reality of universe mean? The whole of science is bound to needs, to life, to the activity of the humanity. Without humanity's activity, which creates all, even scientific, values, what would "objectivity" be? A chaos, i.e. nothing, a void, if one can indeed say that, because in reality, if one imagines that humanity does not exist, one cannot imagine language and thought.

A discourse about reality does not make sense if it does not take into account the human beings that create it and live in it. Therefore the objectivity of reality is just the result of a convention among scientists as Omodeo has pointed out: "for him [Gramsci] it does not exist a 'nature', neither human, nor extra-human: nature is a concept, a relationship: it does not build up the scientific activity, but it is a product of it".[30] In another note this conception is further illustrated through a hint at the concepts of "West" and "East" and with a meaningful example from Bertrand Russell.[31]

Later I will dwell on the features of scientific knowledge that emerge from these observations; now I would like to concentrate myself on the *pars destruens* of his argument. The objectivity of reality is in no way brought into question by the "common sense" of a "religious" (even when secularised) belief.[32] The author of the *Popular Manual*, Gramsci argues, shares the

[28] Cospito, *Il marxismo sovietico e Engels*, p. 757. See Q 11, § 17, pp. 1415-1416; SPN, p. 807: "Objective always means 'humanly objective', which can be held to correspond exactly to 'historically subjective': in other words, objective would mean 'universal subjective'. Man knows objectively in so far as knowledge is real for the whole human race *historically* unified in a single unitary cultural system".

[29] Q 11, § 37, p. 1457; FS, p. 292.

[30] Omodeo, "La via gramsciana", p. 66.

[31] See Q 11, § 20, p. 1419; SPN, pp. 809-810: "To understand exactly what might be meant by the problem of the reality of the external world it might be worth taking up the example of the notions of 'East' and 'West', which do not cease to be 'objectively real' even though analysis shows them to be no more than a conventional, that is 'historic-cultural' construction. […] One can also recall the example contained in a little book by Bertrand Russell […] Russell says approximately this: 'We cannot, without the existence of man on the earth, think of the existence of London or Edinburgh, but we can think of the existence of two points in space, one to the North and one to the South, where London and Edinburgh now are.' It could be objected that without the existence of man one cannot think of 'thinking', one cannot think at all of any fact or relationship which exists only in so far as man exists. What would North–South or East–West mean without man? They are real relationships and yet they would not exist without man and without the development of civilisation. Obviously East and West are arbitrary and conventional, that is historical, constructions, since outside of real history every point on the earth is East and West at the same time". On Gramsci and Russell see Cospito, *Gli strumenti logici del pensiero*.

[32] See Q 11, § 37, p. 1456; FS, p. 291: "Common sense asserts the objectivity of the real in so far as reality, the world, has been created by God independently of and before humanity". On the Gramscian conception of "common sense" see the entry *Senso comune* by Guido Liguori in Liguori-Voza, *Dizionario gramsciano*, pp. 759-761 and Gensini, Stefano, "Appunti su 'linguaggio',

same "mythological conception of the world"[33] when he sets himself against the supporters of a "subjectivist conception of reality".[34] Instead of taking it seriously into account, as the philosophy of praxis should do (Gramsci reconnects the "idealist assertion of the reality of the world as a creation of the human spirit" to his conception of the historicity of the ideologies and of the superstructures),[35] in his essay of 1931, he rejects it harshly (in this way Gramsci demonstrates the "conservatism" of Bukharin's conception and its fetishism for positivistic science):[36]

> The point that must be made against the *Popular Manual* is that it has presented the subjectivist conception just as it appears from the point of view of common-sense criticism and that it has adopted the conception of the objective reality of the external world in its most trivial and uncritical sense without so much as a suspicion that it can run into objections on the grounds of mysticism, as indeed it has.

The "cumulative" nature of science

In his effort to overcome both the idealist and the materialistic construct, Gramsci outlines an idea of science that is deeply influenced by his "absolute historicism", as clearly emerges from the *pars construens* of his analysis.

In this formula he synthesises his rejection of the "philosophy of history" and his claims to the complexity and the irreducibility of reality, which cannot be understood from an external and superior point of view. Not by chance the core of this conception is the category of "immanence", which demolishes every belief in a transcendent truth by arguing the inescapable "earthliness" of human thought and action. Thus, Gramscian historicism strongly opposes the

---

'senso comune' e 'traduzione' in Gramsci", *il cannocchiale*, 2012, 3: 163-193. A very interesting Gramscian topic (that, for reasons of space, I cannot deepen here) which is connected to the relation of science and common sense is represented by the use of the scientific knowledge made by the Church and in particular by the Jesuits; see Di Meo, *L'"oggettività del reale"* (on the neo-scholastic).

[33] Q 11, § 37, p. 1456; FS, p. 291.

[34] See Q 11, §§ 36-68. The supporters of a subjectivist conception of the world are, in Gramsci's view, the representatives of the so called "new physics" (i.e., quantum mechanics); however, he criticises more directly with two Italian intellectuals (Giuseppe Antonio Borgese and Mario Camis) who tried to "popularise" this conception – see for all these questions Greco, *Antonio Gramsci e i quanti*.

[35] Q 11, § 17, p. 1413; SPN, p. 803. Here is the entire passage: "It is surprising that there has been no proper affirmation and development of the connection between the idealist assertion of the reality of the world as a creation of the human spirit and the affirmation made by the philosophy of praxis of the historicity and transience of ideologies on the grounds that ideologies are expressions of the structure and are modified by modifications of the structure" (SPN, p. 803).

[36] Q 11, § 17, p. 1415; SPN, p. 806.

mechanistic and economistic (i.e. teleological) approaches to history, as well as the classical and idealistic (speculative) interpretations of historicism; the label of "absolute" distinguishes it from these misleading readings and highlights the inclusive essence of his philosophy of praxis.[37]
If this is the general context, it reflects significantly on Gramsci's notes on science. If, on the one hand, in his stressing the singularity of science there is of course a polemical intent (notably to distinguish historical materialism from scientific knowledge, stigmatising Bukharin's approach), on the other hand, the affirmation of the "incommensurability" of scientific research entails a peculiar historical nature of the discipline.

According to Gramsci, the main feature of science lies in its nature of "work in progress". This implies not only its character of continuing revision of previous hypotheses and instruments, but also the existence of a structural "ignorance" (at this point a parallel with Veca's concept of "explorative incompleteness" could be particularly stimulating):[38]

> Scientific work has two main aspects: the first constantly corrects our way of knowing, corrects and reinforces our sensory organs, formulates new and complex principles of induction and deduction, that is to say refines the very instruments of experiment and experimental control; the second one applies this ensemble of instruments (on a material and on mental variety) to draw a dividing line between what is essential in the sensations and what is arbitrary, individual, transitory. [...] If scientific truths were conclusive, science would have ceased to exist as such, as research, as new experiments, and scientific activity would be reduced to popularising what has already been discovered. Fortunately for science this is not true. But if scientific truths themselves are not conclusive and unchallengeable, then science too is a historical category, a movement in continual development. Only that science does not lay down any form of metaphysical "unknowable", but reduces what humanity does not know to an empirical "not knowledge", which does not exclude the possibility of its being known, but makes it

[37] See Q 11, § 27, p. 1437; SPN, p. 836 ("The philosophy of praxis is absolute 'historicism', the absolute secularisation and earthliness of thought, an absolute humanism of history"). On the thorny problem of Gramscian "absolute historicism" and on his connection with the category of "immanence" see the entry *Storicismo* by Giuseppe Cacciatore and *Immanenza* by Fabio Frosini, in Liguori-Voza, *Dizionario gramsciano*, respectively, pp. 814-818 and pp. 408-412; see also Frosini, Fabio, "Storicismo e storia nei *Quaderni del carcere* di Antonio Gramsci", *Bollettino filosofico*, 2011-2012, pp. 351-367 and Frosini, *La religione dell'uomo moderno*, cap. II, pp. 112-161.

[38] See Salvatore Veca, *L'idea di incompletezza. Quattro lezioni* (Milano: Feltrinelli 2011), p. 14. The occasion that gave birth to this essay was in fact the reading of Salvatore Veca's recent book about the idea of incompleteness. In this work Veca focuses on the limits and on the structural problems of answering to the "request for theory", i.e., the request for a theoretical explanation of "uncertain" situations, by rejecting both the so called "new realism" and the "postmodern", Nietzschean interpretation of the issue (pp. 7 ff). Within this context he investigates also the nature of science: on the one hand it differs from the humanistic knowledge for its "cumulative" nature and for its character of "justificatory narration" (i.e. every scientific theory takes into account and explains the previous one; see p. 56); on the other hand, science is similar to art and literature, in so far as it is historically determined and sometimes lives "crises of explanation" (Veca underlines the complex historical dynamics that bring to scientific discoveries; see p. 59). Therefore, science appears as a form of knowledge that should be considered not only in relation to its "completeness" but also in relation to its "incompleteness" and historicity. In my opinion these categories can offer an original and stimulating theoretical frame to analyse Gramsci's reflection.

> conditional on the development of physical instrumental elements and on the development of the historical understanding of single scientists.[39]

For Gramsci, the development of science is different from that of the other disciplines; whereas in literature, art or philosophy there are "changes of tendency" rather than an evolution, science owns a peculiar "cumulative" nature, i.e., it adds knowledge to knowledge and considers the earlier notions as the basis for the successive ones ("has the whole process of science not up to now been manifested in the fact that new experiments and observations have corrected and extended previous experiments and observations?").[40] Furthermore, in Gramsci's opinion, the existence of the scientific objects itself is historically determined. As he says about the matter: [41]

> Clearly, for the philosophy of praxis, "matter" should be understood neither in the meaning that it has acquired in natural science […] nor in any of the meanings that one finds in the various materialistic metaphysics. […] Matter as such therefore is not our subject but how it is socially and historically organised for production, and natural science should be seen correspondingly as essentially an historical category, a human relation. Has the *ensemble* of the properties of all forms of matter always been the same? The history of the technical sciences shows that it has not. For how long was the mechanical power of steam neglected? Can it be claimed that this mechanical power existed before it was harnessed by man-made machines? Might it not be said in a sense, and up to a certain point, that what nature provides the opportunity for are not discoveries and inventions of pre-existing forces – of pre-existing qualities of matter – but "creations", which are closely linked to the interests of society and to the development and further necessities of development of the forces of production?

Then he takes also electricity as an example: [42]

> Electricity is historically active, not merely however as a natural force (e.g. an electrical discharge which causes a fire) but as a productive element dominated by man and incorporated into the ensemble of the material forces of production, an object of private

[39] Q 11, § 37, pp. 1455-1457; FS, pp. 291-2.

[40] Q 11, § 36, p. 1452; FS, p. 287. On the cumulative character of science see also Q 11, § 30, p. 1445 (SPN, p. 840). Here, while discussing the atomistic theory and the latest scientific discoveries, Gramsci wrote: "Is modern atomic theory a 'definitive' theory, established once and for all? What scientist would dare make such an assertion? Might it not rather be simply a scientific hypothesis which may be superseded, that is to say, absorbed into a vaster and more comprehensive theory? […] If atomic theory is what the *Manual* makes it out to be, given that the history of society is a series of upheavals and there have been many forms of society whereas atomic theory would appear to be the reflection of an ever-constant natural reality, how then has society not always obeyed this law? Or is it being claimed that the change from the mediaeval corporate regime to economic individualism was antiscientific, a mistake of history and of nature? According to the theory of praxis it is evident that it is not atomic theory that explains human history but the other way about: in other words that atomic theory and all scientific hypotheses and opinions are superstructures".

[41] Q 11, § 30, pp. 1442-1443; SPN, pp. 836-837.

[42] Q 11, § 30, pp. 1443-1444; SPN, p. 838.

> property. As an abstract natural force electricity exists even before its reduction to a productive force, but it was not historically operative and was just a subject of hypothetical discourse in natural history (earlier still it was historical "nothingness", since no one was interested in it or indeed knew anything about it).

Scientific discoveries, according to Gramsci, are to be considered "creations" since the aspects of the reality they describe do not "exist" before the men become conscious of them and they become part of human history: it means, according to the Gramscian re-elaboration of the Marxian *Critique* of 1859, until the conditions for a change become available. Consequently, it is apparent that science is something "historical", despite the claims of many theoreticians and scientists about the "Esperanto or Volapük of philosophy and science".[43]

The scientific "ideology"

Due to this cumulative aspect, the evolution of science appears as a "justificatory narration", i.e., a kind of knowledge the necessity of which is warranted by its own historical genealogy.[44] From a Gramscian point of view this means that even science is a form of ideology. As is known, in Gramsci's theory the concept of ideology is pivotal. By reassessing Marxian principles, he gives a positive definition of ideology: "ideological" is every kind of knowledge, since the knowledge entails theory and praxis and is variously connected to the historical and political context in which knowledge is developed and which is, in its turn, influenced by knowledge.[45]

To argue that science is an ideology means that the scientific knowledge is not a universal, abstract and lifeless achievement, but, on the contrary, it is unavoidably related to the

[43] See Q 11, § 45, pp. 1466-1467; SPN, pp. 303-304: "From an incomprehension of the historicity of languages and therefore of philosophies, ideologies and scientific opinions, there stems a tendency that is characteristic of all form of thought (including idealist-historicist ones) to build themselves up as an Esperanto or Volapük of philosophy and science. [...] For the Esperantists of philosophy and science, everything that is not expressed in their language is a delirium, a prejudice, a superstition, etc. [...] Philosophical Esperantism is especially rooted in positivist and naturalistic conceptions". Sarcastically, Gramsci quotes two artificial and a-historical languages as examples of conceptions of the world detached from history and, more generally, from human reality (see also, *mutatis mutantis*, Q 11, § 18, p. 1417; SPN, p. 812: "methodical anti-historicism is sheer metaphysics"; the Volapük is an artificial language created by the German priest J. M. Schleyer in 1879-1880; it was replaced by the creation of the far more popular Esperanto at the end of the 19th century). Gramsci discusses the topic of the scientific languages in some other notes of notebook 11 (in particular in the fifth section of the notebook entitled *Traducibilità dei linguaggi scientifici e filosofici* [Translatability of the scientific and philosophical languages]). On the theme of language see the entry *Linguaggio* by Derek Boothman in Liguori-Voza, *Dizionario gramsciano*, pp. 482-483, but especially Giancarlo Schirru, *Filosofia del linguaggio e filosofia della prassi*, in Giasi, *Gramsci nel suo tempo*, pp. 767-791 and Alessandro Carlucci, *Gramsci and Language. Unification, Diversity, Hegemony*, (Leiden: Brill, 2013).

[44] Veca, *L'idea di incompletezza*.

[45] On the Gramscian reappraisal of the *Critique* of 1859 and on the concept of ideology see the entry *Ideologia* by Guido Liguori in Liguori-Voza, *Dizionario gramsciano*, pp. 399-403, but especially Fabio Frosini, *Gramsci e la filosofia. Saggio sui* Quaderni del carcere (Roma: Carocci, 2003), pp. 79 ff., Fabio Frosini, *Da Gramsci a Marx. Ideologià, verità e politica*, (Roma: DeriveApprodi, 2009) and Frosini, *La religione dell'uomo moderno*, pp. 76 ff. *et passim.*

determinate historical conjunctions and to the single human beings that make it possible (therefore science involves, although not directly, an entire world of social relations, political beliefs, etc.).[46] A demonstration of the "superstructural" (i. e. ideological) character of scientific knowledge is provided by the history of culture: it is known, in fact, that in the past science was defeated by stronger ideologies and encountered "eclipses". As he writes in Q 11, § 38, [47]

> science too is a superstructure, an ideology. […] That science is a superstructure is also demonstrated by the fact that it has had whole periods of eclipse, obscured as it was by another dominant ideology, religion, which claimed that it had absorbed science itself: thus the science and technology of the Arabs seemed pure witchcraft to the Christians. Further, and notwithstanding all the efforts of scientists, science never appears as a bare objective notion – it always appears in the trappings of an ideology: in concrete terms, science is the union of the objective fact with a hypothesis or system of hypothesis which go beyond the mere objective fact.

Also the historical delay of Italy in the scientific field, on which Gramsci focuses in some notes, is a consequence of this fight between antagonistic ideologies and of the influence of the catholic religion.[48]

History of science and history of technology

The demonstration of the ideological nature of science is in line with the conception of the role of technology. If it true that the improvement of the instruments and of the techniques greatly contributes to the development of scientific knowledge, it is also true that the history of science cannot be reduced to the history of technology, as affirmed by Bukharin (and Loria before him).[49] As the examples of geology and mathematics show, the principal "instrument" of a scientist is his/her mind: [50]

[46] See also Omodeo, "La via gramsciana", pp. 60-61.

[47] Q 11, § 38, p. 1458; FS, p. 293.

[48] See Omodeo, "La via gramsciana", p. 61 (he quotes Q 6, § 152, p. 809).

[49] See Q 11, § 21, pp. 1420-1422; SPN, pp. 824-825: "It is affirmed, in the *Popular Manual*, that the progress of science is dependent, as an effect from a cause, on the development of the instruments of science. This is a corollary of the general principle adopted by the *Manual*, originating with Loria, about the historical function of the 'instrument of production and work' (which is substituted for the ensemble of social relations of production). But in the science of geology no instruments except a hammer are used and the technical progress in hammers is in no way comparable with progress in geology. If the history of sciences can be reduced, as the *Manual* claims, to the history of their particular instruments, how can one produce a history of geology? It is no good saying that geology is based also on the progress of a complex of other sciences so that the history of the instruments of these sciences helps to describe the history of geology, because with this let-out one ends up with an empty generalisation and a recourse to ever-wider movements right up to the relations of production. It is very apt that the motto of geology should be 'mente et malleo'" (it seems Gramsci ignores basic field equipment of geology, as for instance maps, compasses, theodolites, photographic cameras, microscopes and 3D models, then used for quite some time). Shortly after that he

> It can be said in general that the advance of science cannot be materially documented. The history of the sciences can at most be brought alive in the memory and that not in all cases, through the description of the successive perfecting of the instruments which have been one means of advance and through the description of the machines which have been applications of the science itself. The principal "instruments" of scientific progress are of an intellectual (and even political) and methodological order and Engels has written that "intellectual instruments" are not born from nothing and are not innate in man, but are acquired, have developed and are developing historically.

Even if the materiality plays an important role in the development of scientific knowledge (see Q 11, § 29, where, by stigmatising the position of Bukharin's *Popular Manual*, he shows how difficult it is to distinguish clearly between what can be considered "structure" or "superstructure"),[51] science remains an ideology and its development is influenced by the historical and political circumstances in which scientists work.

For a "unified" conception of reality

Gramsci's claim against the absoluteness of scientific knowledge implies a strong critique of the necessity of progress and, more generally, a refusal of every "scientific superstition".[52]

---

mentions mathematics as example: "How superficial the affirmation in the *Manual* is can be seen from the example of the mathematical sciences which have no need of any material instruments (the development of the abacus, is not, I think, a valid counter-example) and which are themselves an 'instrument' of all the natural sciences" (SPN, p. 826). On Bukharin's "degeneration" see also Q 11, § 29, pp. 1441-1442; SPN, pp. 830-831: "It is clear that the whole theory of the technical instrument in the *Manual* is pure *abracadabra* and comparable to the theory of memory concocted by Croce to explain why artists are not content to conceive their works purely in an ideal form but write them or sculpt them. etc. […] There is no doubt that all this is just an infantile deviation of the philosophy of praxis generated by the baroque conviction that the more one goes back to 'material' objects the more orthodox one must be". On this theme see Lefons, "Scienza, tecnica", pp. 117-118, Cospito, *Il marxismo sovietico e Engels*, p. 755 (and especially footnote 43, that contains interesting observations on the differences between the first version [Q 7, § 5] and the second version of the note [Q 11, § 21]) and Voza, "La critica di ciò che è 'oggettivo'", pp. 50-51.

[50] Q 11, § 21, p. 1421; SPN, p. 825. And it continues: "How great a contribution to the progress of science was made by the expulsion from the scientific fields of the authority of Aristotle and the Bible? And was not this expulsion due to the general progress of modern society? Recall the example of theories on the origin of springs. The first exact formulation of the way that springs are produced is to be found in the *Encyclopaedia* of Diderot, etc. While the ordinary people can be shown to have had correct opinions on the question before then, in the scientific world there were a succession of the most arbitrary and bizarre theories which aimed to reconcile the Bible and Aristotle with the experimental observations of good sense" (SPN, p. 825).

[51] Q 11, § 29, p. 1441; SPN, pp. 826-831. In this case it is interesting to confront the first version of the note (Q 4, § 12 and § 19) with the second one (Q 11, § 29): not only in the second version Gramsci has deeply re-elaborated the text, but also the references to Bukharin and Loria are clearer and sharper.

[52] See Q 28, § 11, p. 2330: "The Land of Cokaygne motif that Croce finds in Graziadei is of a certain general interest, since it serves to outline a subterranean current of romanticism and popular phantasizing that is fuelled by the 'cult of science', by the 'religion of progress' and by twentieth century optimism, which itself is also a form of opium" – I thank Derek Boothman for having provided me with this translation). The same motive of the "Land of Cokaygne" and of the intellectual opium is recalled also in Q 11, § 39, pp. 1458-1459; FS, pp. 294-5: "is to be noted that, together with the most superficial infatuation for the sciences, there exists in reality the greatest ignorance about scientific facts and methods, things that are very difficult and are becoming all the more difficult because of the progressive specialisation of new branches of research. Scientific superstition carries such ridiculous illusion and such infantile conceptions that religious superstition finds itself ennobled by them. Scientific progress has given birth to belief in and the expectation of a new Messiah who will bring about the Land of the Cokaygne on this earth. The forces of nature, without any intervention from human toil but through the action of eve more perfected

Nevertheless, science represents also a "forerunner" of the philosophy of praxis since it is able to join the abstract and intellectual reflection with the practical activity (in other words, to find a mediation between nature and culture, according to Gramscian historical materialism).[53]

> Engels' phrase that "the materiality of the world is demonstrated by the long and laborious development of philosophy and natural science" should be analysed and made more precise. Does science mean theoretical activity or the practical-experimental activity of scientists, or a synthesis of the two? One might say that the typical unitary process of reality is found here in the experimental activity of the scientist, which is the first model of dialectical mediation between man and nature, and the elementary historical cell through which man puts himself into relation with nature by means of technology, knows her and dominates her. There can be no doubt that the rise of the experimental method separates two historical worlds, two epochs, and initiates the process of dissolution of theology and metaphysics and the process of development of modern thought whose consummation is in the philosophy of praxis. Scientific experiment is the first cell of the new method of production, of the new form of active union of man and nature. The scientist-experimenter is also a worker, not a pure thinker, and his thought is continually controlled by practice and vice versa, until there is formed the perfect unity of theory and practice.[54]

As stated in this passage from Q 11, § 34, the scientific activity constitutes the first, concrete step towards the elaboration of a "unified" conception of reality (and this unification must not be confused with an idealist or materialism monism). At the same time, science is also the first example of a new form of life and production, i.e., it is the basis of a desirable "intellectual and moral reform" of the society.[55] Moreover, science has also a privileged position among the superstructures: because of the possibility of distinguishing between the fact and the hypothesis (as he says in Q 11, § 38), it enables the proletariat to take possession of the scientific knowledge of the bourgeoisie, with the great advantage of the workers' movement.[56]

---

mechanisms, will give society an abundance of everything necessary for satisfying its needs and living at ease. This infatuation – the abstract superficial faith in humanity's miracle-working ability – leads paradoxically to the sterilisation of the very bases of this ability and to the destruction of all love for concrete and necessary work in new type of opium". On the concept of progress see also Q 10, II, § 48, p. 1335; SPN, p. 677: "Progress is an ideology: [...] 'Progress' depends on a specific mentality, in the constitution of which are involved certain historically determined cultural elements: 'becoming' is a philosophical concept from which 'progress' can be absent. In the idea of progress is implied the possibility of quantitative and qualitative measuring, of 'more' and 'better'".

[53] See Omodeo, "La via gramsciana alla scienza", p. 55 and Di Meo, *L'"oggettività del reale"*, p. 134.

[54] Q 11, § 34, pp. 1449-1449; SPN, pp. 808-809.

[55] See Boothman, "Scienza e traducibilità", p. 51. See also Voza, "La critica di ciò che è 'oggettivo'", pp. 51-52.

[56] See on this point Voza, "La critica di ciò che è 'oggettivo'", p. 52. However, as Voza also recognised, this Gramscian statement is problematic (Voza rightly underlines the obscure style of the passage as well).

Science and hegemony

Last but not least, the ideological character of scientific knowledge implies a reassessment of it within the context of "cultural hegemony", which has to be considered as a part of the general hegemonic process.[57]

A reconsideration of the role of the scientists within society, a bigger awareness of the (in a broader sense) political meaning of scientific knowledge, as well as a critical reflection on the purposes of the operations of science popularisation are logical consequences of a serious "interiorisation" of Gramsci's observations. From this point of view, in fact, the Gramscian notes represent a starting point for further reflections rather than a complete analysis of the issue. In the *Prison Notebooks* it is possible to find some significant consideration on the appropriation of scientific knowledge by the ruling class, on the application of scientific methods to economical production and on science education and popularisation that can be fruitfully applied to different historical and political scenarios.[58]

Conclusions

To sum up, this paper presents an overview of Gramsci's idea of science from his *Prison Notebooks*. First of all I concentrated on his polemical targets, Croce and Bukharin; although their conceptions originated from very different cultural *milieux*, they similarly consider science as an a-critical and a-historical form of knowledge (in particular I analysed Gramsci's discard of Bukharin's positivistic belief in the alleged "objectivity of the scientific knowledge").

Secondly, I focussed on the connection between his notion of science and his "absolute historicism", by highlighting the peculiar "historical" nature of scientific knowledge and its

[57] For an introduction to the Gramscian category of "hegemony" see Giuseppe Cospito, *Egemonia*, in Fabio Frosini and Guido Liguori (eds), *Le parole di Gramsci* (Roma: Carocci, 2004), pp. 74-92. On the topic see also Giuseppe Cospito, *"Il ritmo del pensiero". Per una lettura diacronica dei* Quaderni del carcere *di Gramsci* (Napoli: Bibliopolis, 2011), chapter II, pp. 77-126, Angelo D'Orsi (ed), *Egemonie* (Napoli: Dante & Descartes, 2008) and Mauro Pala (ed), *Narrazioni egemoniche. Gramsci, letteratura e società civile* (Bologna: Il Mulino, 2014). I would like to note also the papers on the concept of hegemony by Cospito, Frosini and Schirru, which were presented during the *Ghilarza Summer School 2014 – Scuola Internazionale di Studi Gramsciani* (Ghilarza (OR), Italy, 8th-12th September 2014) and will be published soon; the programme is available at: http://www.internationalgramscisociety.org/communications/gss2014.html). In general, "cultural hegemony" represents only an aspect of the multifaceted hegemonic process investigated by Gramsci; as Cospito wrote, "the *civil* or *political hegemony* [is] connected and not opposed to the *cultural* and *intellectual* one" (Cospito, *Egemonia*, p. 89). As a matter of fact, the cultural aspect of hegemony is strictly linked to the role of intellectuals within society and to "intellectual and moral reform" with all its political and practical consequences (this issue, however, is very complex and cannot be examined deeply here).

[58] See first of all Nieto-Galan, "Antonio Gramsci Revisited" and Gavroglu, Kostas, "Science popularization, hegemonic ideology and commercialized science", *Journal of History of Science and Technology*, 2012, 6: 85-99. The conference that took place in Barcelona on 22th-24th January 2014 (*Science as Cultural Hegemony. Gramscian Concepts for the History of Science*, Centre d'Història de la Ciència (CEHIC), Universitat Autònoma de Barcelona-Institut d'Estudis Catalans), where a first version of this paper was presented, was a unique occasion to discuss these topics.

impossibility of being compared with other disciplines (art, literature, etc). As far as the evolution of science is the result of a cumulative process, it appears as a "justificatory narration" and, consequently, as a form of ideology.

This perspective entails a new reading of the history of science, which appears strictly connected to the social and political contexts and to the single human actors that made it (and not simply, as was affirmed, to the development of technical instruments). Moreover, the ideological character of science implies a reconsideration of it in the context of the struggle for "hegemony", i.e., a reassessment within the framework of the political and social transformations analysed by Gramsci.

Noteworthy corollaries are the critique of the concept of progress and, more generally, the refusal of blind faith in scientific knowledge. However, the most important consequence of these observations, in Gramsci's view, is the possibility of taking science as a model of a "unified" conception of reality, which, according to his "philosophy of praxis", is able to join intellectual reflection with practical activity.

In conclusion, the notion of science represents not only a useful critical tool, but also a meaningful *tessera* of the bigger mosaic of the *Prison Notebooks*: I have tried to show how Gramscian reflections on scientific knowledge involve many different aspects of his conceptual system and of his interpretation of Marxism. Due to its richness, Gramsci's interpretation constitutes a fruitful field of speculation for historians of science, a starting point not only to reflect on the nature of scientific knowledge in itself, but also to get a deeper comprehension of the historical and political mechanisms that govern the (lack of) success of a specific scientific theory.

Acknowledgements

I wish to thank Derek Boothman, Giuseppe Cospito and Pietro Daniel Omodeo for their precious suggestions. A special thanks to Robert Jackson for checking my English.