Explaining the Scientific Success. A Critique of an Abductive Defence of Scientific Realism

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This paper aims to show the main limit of an abductive defense of scientific realism. My work illustrates how the well known *Inference to the Best Explanation* (I.B.E.), when adopted to explain the success of scientific theories, should be considered inadequate to sustain a *metaphysical* acceptation of scientific realism. The present analysis shows how an *epistemic* notion of truth is indissolubly involved by the adoption of an abductive argument, revealing how metaphysical realism, when conceived the best explanation for scientific success, has to be judged an unsatisfactory suggestion.

The present work is divided into two sections. In the first part Peirce's conception of abduction (section 1.1) will be introduced as a fundamental reference inspiring the contemporary employment of the abductive reasoning. Afterward, it will be analyzed how an instance of abductive reasoning has been used to explain the success of experimental science by contemporary realists (section 1.2). In the second section it will be shown how the occurrence of abductive an reasoning involves epistemic constraints related with its selective character (section 2.1). Finally, some comments concerning the explicative limits of metaphysical realism will be suggested.

1 The explanatory problem and the metaphysical argument

Introducing the *explanatory problem* concerning the success of the best available scientific theories is usual to make a reference to a famous germinal paper by Gilbert Harman (1965)[1], this is the locus classicus where the notion of Inference to the Best Explanation (I.B.E.) has been introduced to solve questions regarding the epistemic justification of enumerative induction. As it will be shown in the following sections, more recently an occurrence of Harman's argument has been advanced to restore a realist statement after years of skeptical dominance in philosophy of science.

In recent times, the renewed exigency to contrast the anti-realist movement in philosophy of science has been influenced by Putnam's works on the justification of the empirical success of science. Putnam (1975) and others (for example John Smart, 1963 and Richard Boyd, 1983a, 1983b, 1989) have tried to show how the positivist conception leaves unexplained factual features characterizing the scientific knowledge such as its unity among different theoretical domains, its

[1]Gilbert Harman was the first to introduce the concept of Inference to the Best Explanation within the contemporary debate. Other significant topics where Harman use this notion are Harman (1967) and Harman (1968).

continuity between successively paradigms and the experimental success of our best scientific theories. Actually, the problem of explanation represents the main area of inquiry where a great deal of contributes committed to the question of scientific realism are concentrated.[2]

Core of the realist explicative thesis is the *non-epistemic notion of truth*, that is, a metaphysical interpretation of Tarski's schema that endorses the possibility to define a direct connection between scientific constructs and the ontological domain (see below section 1.2). The main reasoning adopted by scientific realists can be considered an occurrence of what the early father of pragmatism C.S. Peirce called first an *ampliative* inference. For this reason, next section will be dedicated to analyze some aspects of Peirce's influential conception about explanation.

1.1 Peirce on abduction

Within the modern debate, the philosophical interest for the abductive reasoning is mainly related to the work of C.S. Peirce. The term *abduction* is drawn by Peirce from Aristotle's Prior Analytics (see Collected Papers 5.144 - from here C.P.), but the structure of this kind of reasoning is a recurring theme along the entire history of science (one for all the case of Kepler's abductive reasoning described by Atocha, 2006).

To sum up Peirce's idea, abduction can be considered a form of *ampliative reasoning* that makes it possible to increase knowledge "guessing" the right explicative hypothesis (C.P. 7.219-20). Using a famous example introduced by Peirce, it's possible to define the abductive reasoning in a syllogistic schema as follows (C.P. 2.623):

1. Rule: All the beans from this bag are white
2. Result: These beans are white
3. Fact: These beans are from this bag

In a mature phase of his thought (see the Hardware Lectures of 1903), Peirce has concentrated part of his work into the research of an *epistemic justification* for the abductive line of reasoning. The question:

> what should an explanatory hypothesis be to be worthy to rank as a hypothesis? (C.P. 5.197)

was used by Peirce distinguishing two basic aspects, a *generative* and an *evaluative*,constituting an explicative inference.[3]. Following Peirce, the generative aspect of an explicative inference corresponds to the starting reasoning following the discovery of new recalcitrant facts. This early phase of the explanatory process is identifiable with the attempt to detect plausible hypothesis, or a set

[2]Many different topics constitute the realism/anti-realism debate. Here it will be examined a typical form of epistemic approach called "explanatory thesis". Another form of approach is, for example, the *logical* approach well represented by discussions related to Fitch's paradox (also known as paradox of knowability).

[3]For an analogous distinction see L. Magnani(2001), where the creative character of abduction is associated with the evaluative function of the Inference to the best explanation.

of them, that seem to be able to provide intelligibility to facts otherwise surprising. With Pirce's words:

> Abduction is the process of *forming* an explanatory hypothesis(C.P. 5.171)

Whereas the evaluative moment concerns, for Peirce, the specific selection of one of these previously detected hypotheses. In Peirce's words:

> Abduction is the process of *choosing* a hypothesis(C.P. 7.219)

For Peirce, every explanation starts with the ascertainment of an unexpected state of marvel. The importance of this condition is represented efficaciously by the image of a ship proceeding his sailing over a smooth sea, without any augury otherwise the monotony of such a voyage, when suddenly, an *unforeseen* impact with a rock occurs (C.P. 5.51). In light of this conception, abduction is considered by Peirce the first step of scientific enquiry, it represents the main form of answer to the *undesirable* state of uncertainty related with common experience of *recalcitrant* facts. [4]

Furthermore, Peirce pays special attention to underlying the state of *uncertainty* related with the condition of plurality typical of many generative moments where more than one plausible explanation is inferable as regard the same set of (surprising) data. This unsatisfactory condition is well described by one of most famous Peirce's examples:

> given a certain phenomena discovered by a physicist, it's always questionable how does he know but the conjuncts of the planets have something to do with it, or that it is not perhaps because the dowager express of China has at same time, a year ago, changed to pronounce some word of mystical power, or some invisible jinnee may be present(C.P. 5.172)

So, following Peirce, trillions of trillions of hypotheses might be advanced, even if we are looking just for one explanation. An undesirable condition of ambiguity that reveals the incompleteness of an explicative reasoning based only on what Peirce calls the generative moment, evidencing the central role played by the practice of evaluation.

Beside the power to confer intelligibility to surprising facts, the evaluative process constituting a complete abductive inference is characterized for Peirce by a proper internal epistemic structure.Two are for Peirce the main characteristics ascribable to an evaluative moment: the *economicity* and the *observational character* (CP 7.220). The economicity of an explicative hypothesis consists, for Peirce, in the evaluation of three distinct epistemic parameters: i) its *methodological* value, that is, the rationality used to generate a certain explicative proposal; ii) its power to involve other aspects of knowledge, defining new interactions between different disciplines; iii) and finally its costs of experimentation. On the other hand, the observational character represents an essential form

[4]Following Peirce, the generation of a new plausible hypothesis starts with an *appeal to instinct* and evolves in a gradual way (C.P. 1.630). It moves from a *dark laboring*, bursting out the *startling conjecture* and showing at the end how an explicative hypothesis corresponds perfectly to the initial anomaly, as well as *a key opens a locked door* (C.P. 6.469).

of epistemic appraisal consisting in to take at proof every explicative proposal, evaluating its adherence with available or expected data. Therefore, the selective process of explanation is defined by Peirce not only by rational criteria (such as represented by the properties of economicity), but also by the comparison between hypotheses and facts:

> any hypotheses therefore, may be admissible, in the absence of any *special reasons* to the contrary, provided it be capable of *experimental verification*, and only insofar as it is capable of such verification (C.P. 5.197, the emphasis is mine).

Resuming the critical points individuated in this short introduction to Peirce's theory of abductive reasoning, it is opportune to underline the following points:

1. Peirce distinguishes the internal structures of abductive reasoning in a *generative* moment and in a *evaluative* one. The former concerns conjecturing about a range of plausible explicative hypotheses, the latter concerns the selection of *the best* explicative solution;
2. Peirce evidences the importance of an evaluative moment to obtain the satisfactory condition represented by the achievement of an unambiguous explanation;
3. to make possible an explanatory evaluation, Peirce's conception suggests the adoption of epistemic criteria such as *economicity*, and *empirical verifiability*.

With these distinctions in mind, it is now possible to move forward analyzing how the contemporary debate on scientific realism has interpreted and employed the Peirceian notion of abductive reasoning.

1.2 The abductive realism

The recent debate on realism is mainly characterized by the problem of justification related to the empirical success of our best scientific theories. Philosophers such as Peter Lipton (2001) and Stathis Psillos (1999) have dedicated to the justification of the factual success of science large part of their works, supporting the idea that only a realistic interpretation of scientific theories represents the best candidate to explain the possibility of the experimental success.

First to propose this solution, in the middle of the last century, was J.C. Smart who opened the door to the formulation of an explicative conception of realism contrasting phenomenalism on theoretical entities (Smart, 1963). Following the line traced by Smart, Hilary Putnam, in the early period of his thought, has developed his famous *no miracle argument* introducing the exigency to relate the problem of justification concerning scientific success to an *externalist* notion of explanation (Putnam, 1975). With Putnam and successively Richard Boyd (1989), the realist proposal has become one of the most popular topic in philosophy of science, a view well resumed and analyzed in an exhaustive book edited by Stathis Psillos (Psillos, 1999)[5].

[5] A separated analysis should be dedicated to a different form of abductive reasoning, the *common cause principle* mutated by W. Salmon from H. Reichenbach's thought. However, the *ontic* realism, developed in Salmon's work (1984), with his special conception of causality, is not the object of the present analyses.

In this version scientific realism is a *metaphysical* thesis introduced as a consequence of an abductive reasoning and formulated to explain the otherwise surprising fact represented by the existence of empirically well confirmed scientific theories. In other words, scientific realism is formulated here as an explicative thesis concerning the existence of a direct relation between the linguistic domain of successful theories and an independent and well fixed ontological statement. Using the abductive schema developed by C.S. Peirce (see section 1.1), the general form of this explanatory suggestion can be presented as follows:[6] (C.P. 5.189):

1. The surprising fact C is observed;
2. but if A is true, C would be a matter of course;
3. Hence, there is reason to suspect that A is true;

Where: 1. represents the starting point of every explanatory problem, that is, the appraisal of recalcitrant data C as regard as the available theoretical context; 2. represents an explicative hypothesis, where the truth value of a certain statement A involves the occurrence of the previously surprising data C, and finally 3. represents the assumption of a certain explanatory hypothesis.

Substituting the fact C with the *success of scientific theories* and considering the *realist thesis* as the hypothesis A, we obtain the general structure of the abductive reasoning adopted by many recent scientific realists. In other words:

1. The fact that scientific theories have empirical success is observed;
2. If scientific realism is true, the empirical success of scientific theories is a matter of course;
3. Hence there is reason to suspect that scientific realism is true;

To understand what assumptions constitute scientific realism, it is possible to adopt three line of argumentation well defined by Stathis Psillos(2005): the *metaphysical* thesis, concerning what is reality; the *semantic* thesis, concerning the truth statement of successful theories and the *epistemic* thesis, regarding the nature of what we know with true theories.

The *metaphysical* thesis is the simplest and intuitive. Assuming a metaphysical conception of realism we accept that the world has a defined statement, independent from every condition of knowledge and human ability to know. In particular, the metaphysical stance distinguishes scientific realism from the anti-realist and the phenomenalist accounts of science, assuming an absolutely independent conception of reality from whatever epistemic statement (M. Devitt, 1991; Psillos, 2000).

This idea, also known as the *mind-independent* condition of knowledge, should be considered a prerequisite for any defense of an explanatory realism, where entities posited by well confirmed theories are assumed to map an *already existing* world (Psillos 1999).

[6] See also Ikka Niiniluoto, 1999

With the assumption of the *semantic* thesis the observational success of well confirmed scientific theories should be taken at the *face value*. Following the realist reasoning, a semantic interpretation of scientific theories makes it possible to define the passage from a factual condition of empirical success to a meta-observational condition of truth, defining what Lipton has called the *truth argument*. This argument relates the explicative power of a hypothesis with its truth likeness condition, so that, if we want to explain the empirical success of science, we ought to assume that experimentally successful theories are, at less, approximately true (Lipton, 2001).

Aim of the third stance constituting scientific realism, the *epistemic* thesis, is to posit the passage from an ascertained condition of truth (semantic thesis), to a description of a metaphysical reality (as established by the first thesis). This result is allowed assuming a so called *inflationist* conception of truth, obtained associating the notion of truth with an ontological statement, while, for a deflationist conception, truth consists in the acceptation of a schema of equivalence - the Tarski's schema - on the formal ground (Horwich 1990). Only assuming that truth likeness corresponds to a relation between language and world, that is, assuming a *substantive* interpretation of the Tarski's schema, truth takes its independence from the epistemic context, showing the explicative value required by scientific realism (see Newton Smith, 1989).

In other words, the epistemic thesis claims that theoretical assertions have a *non-epistemic* truth value (Psillos, 2005). In this way, if with the concept of *epistemic conditions* we denote conventions, hypothetical assumptions or simply information introduced by the subject of knowledge, the non-epistemic conception of truth aims to defend the independence of truth-values from every theorethical context, differently from what is posited by constructive conceptions (see for this Van Fraassen, 1980). With the assumption of a non-epistemic notion of truth, scientific realism takes the form of an abductive reasoning, passing from the factual success of a scientific theory, to the assumption of its correspondence with an epistemic independent domain: the metaphysical reality.

The assumption of these three thesis configures realism as an *a posteriori* argument, suggesting the presence of a link between the employment of an abductive methodology and the achievement of a not epistemic condition of truth. Thus, if we infer abductively an explanatory account of the empirical success of science, as scientific realists do, we obtain that this *surprising result* is explained assuming a direct relation between experimental confirmed theories and certain fixed aspects of an independent world (Mc Mullin, 1984).

Resuming this section, the three major assumptions constituting the realist hypothesis should be defined as follows:

1. Reality is a metaphysical domain, it pertains to a *mind independent* world, that is, to an objective sphere not related to assumptions or conditions constituting knowledge;

2. Successful theories are true, or in other words, terms and propositions involved in well accepted scientific theories have a semantic reference;

3. True is an inflationary ontological notion, it pertains not exclusively to an observational or instrumental domain, but to a metaphysical one.

As it was evidenced above, scientific realism is mainly an explicative thesis, it aims to solve the problem of justification posited by the empirical success of scientific theories. The explicative character of realism is conceived in conjunction with the favor for a *non-epistemic* notion of truth. Only in this way it is possible for a realist to relate the truth likeness of scientific descriptions to an absolutely independent domain, that is, without considering the epistemic role of assumptions such as conventions, or other not-factual stances involved by explicative processes.

2 Is metaphysical realism the best explanation?

Bass Van Fraassen (1980) and more recently Henk de Reght and Dennies Dieks (2005) have showed that the understanding of an explicative process involves the definition of particular purposes and assumptions. Following this line, to understand something is a pragmatic process in the sense that it implies the possibility to choice between different explanations concerning the same fact, assuming different theoretical backgrounds with a different philosophical or social nature. This general condition of context-dependence is usually adopted as a refutation of metaphysical realism, but differently from another well known *confutation of realism* introduced by Laudan (1981), the present argument is not based on a factual analysis related with the historical development of science, but is an epistemic argument concerning the effective procedures by means of which any explanation is made possible.

2.1 The epistemic character of selective abduction

Yemina Ben-Menahem (1990) has sustained that the rationality of an explicative process depends indissolubly on the set of evaluative standards we adopt to assign *explanatory power* to a certain hypothesis (for an analogous position see also Friedman, 1974). In this way, no explanatory problems as well as, no explanations tout court, are possible in a beliefs vacuum (see also section 1.1). In other words something can been judged lacking an explanation only when a set of beliefs are previously assumed, as in the case a certain fact appears surprising in light of a well accepted theory.

Considering every explicative claim contextually dependent involves that in case of variation of a background set of assumptions differences could be also induced in what may be considered *problematic*. In this way, what is an explicative problem in a certain historical moment can be considered an acceptable and unproblematic condition in another, forcing us to consider our explicative problems evolving with the rest of our knowledge (Ben-Menahem, 1990).

For example, while within Aristotle's physics is relevant the exigency to explain how a grave, flanged in the air, carries on its movement even if apparently nothing is sustaining it, with the introduction of the concept of *inertia* we assist at a theoretical change involving the very content of the physical knowledge, as well as at variation of the range of questions we are inclined to advance. For example, after Newton's theory it become irrelevant the question *why the grave has a movement without apparent causes?*, but the problem became *how to explain irregularities of grave's motion?*

As it's clear from the previous section dedicated to C.S. Peirce (1.1), an explanatory process may encounter cases of equivalence as regard as the same empirical statement. For all explicative exigencies related to a certain set of facts (the surprising facts), it's possible to define more than one explicative solution, so that for every explanatory hypothesis could be individuated different alternatives entailing the same evidence. Therefore, the processes of explanation can suffer of the existence of just too many undercutting solutions (Psillos, 2002). This condition is represented by cases where two or more different theories show the same empirical under-determination, or in other words, when different theories propose different kinds of explanation for the same range of (surprising) facts.

Historically this case is well represented by the famous controversy between the Copernican heliocentric theory and the Brahe's geocentric conception, both aiming to explain the same facts related to the observation of some irregular movements of planets. Recently in physics, cases of observational equivalence are represented by the debate between Copenhagen's interpretation of quantum mechanics and the bohmian theory of hidden variables, as well as by the debate between standard particles model of matter and the elegant strings' theory.

As noted by Peirce, the possibility to found alternative explanatory hypotheses justifies the presence of an evaluative moment within the formulation of a general theory of abductive reasoning (section 1.1). With this assumption it is possible to constrain the acceptation of a valid explicative solution, introducing a discriminatory process that makes it possible to promote the choice of only one proposal within a certain set of plausible explicative solutions.

Reformulating the previously introduced abductive schema we have that (Psillos 2002):

1. C is a collection of data (facts, observations);
2. the hypothesis A explains C;
3. No other hypothesis can explain C as well as A does;
4. Therefore the hypothesis A is (probably) true

In general, if there are several candidates to explain the same evidence, one must be able to reject all such alternatives until only a single satisfactory explicative inference is obtained. It is important to note that, in cases such as these, the presence of contextual assumptions can play an important role. Indeed, pre-accepted explanatory criteria guide the explanatory inference, revealing what are the salient explanatory relations, determining the ranking of rival explanatory hypothesis (a condition that is also accepted by a realist such as Psillos, 2007).

Following Lipton (2001), we can conceive the evaluative moment constituting the abductive reasoning a research defining the *loveliest* explanation within a pool of potential candidates. What is important to note here is that, to define whichever set of loveliest explicative arguments, we have to define previously some epistemic filters or, in other words, some *standards of choice* that make it possible the selection of the best available explanatory solution.

Without intention of completeness, it's possible to individuate some of the most relevant epistemic filters that usually guide the process of hypothesis selection:

1. *Unification*: based on the assumption that a hypothesis best explains if unifies the explanandum with other background knowledge;
2. *Parsimony*: based on the assumption that a hypothesis best explains if implies fewer particular assumptions than another;
3. *Consilience*: based on the assumption that the best explanation is the hypothesis that covers the major classes of facts;
4. *Importance*: the best explanation covers the most salient phenomena;
5. *Refute of ad-hocness*: a hypothesis explains better if avoids dogmatic or tautological solutions;
6. *Analogy*: assume that a hypothesis explains better if shares properties with other just accepted explanations;
7. *Observability*: concerning the empirical character of an explicative hypothesis;
8. *Simplicity*: one of the most difficult properties to define in force of its contextual relativity, but one of the most important;

Notwithstanding the incompleteness of the list above, the definition of an ideally complete list of criteria is not enough to understand the entire process of evaluation. Insofar the process of choice is multi-factorial, that is, involves more than one criteria of evaluation, it is not possible to reduce it simply to a quantitative stance. Instead, every standard presents a proper qualitative value. Since that is so to be judged the best explicative hypothesis available is not enough to fit the major number of explicative properties, but it requires to posses the most important of them. In other words, to employ the explanatory virtues listed above, it requires the definition of a *hierarchical structure* that makes it possible to establish priorities among criteria.

It's possible to formulate this condition considering the selective criteria as *principles of explanation*, introduced with the aim to define properties that every processes of understanding should possess. These principles constitute the set of basic assumptions defining what can be called a *theory of explanation*, that is the theory adopted to *individuate* and *solve* explanatory problems. Variations concerning the elements of the list, as well as variations concerning the epistemic value attributed to each of them, generate divergences between different perspectives about what *needs* and what *admits* an explanation.

As in the case of Peirce's condition of economicity (see section 1.1), these principles are not strictly reducible to factual conditions, instead they conserve the aspect of a priori conjectures, such as conventions, and are subjected to different judgments within different contexts (theoreth-ical,historical or social) (see van Fraassen, 1980, or Psillos, 2002).

Moreover, the variability of selective standards admits some internal constraints, limiting combinations between different criteria. This means that not all possible features ascribable to an explanation are reciprocally compatible in all circumstances. As it is noted by Thagard (1978), a typical case of contrast is well represented by the tension between the criterion of *consilience* and the criterion of *parsimony*. Following this line, making a hypothesis more consilient can render it less parsimonious, as in the case when extra assumptions are added to explain some additional facts.

This condition reveals a dependency of explicative criteria from experiential conditions. For this reason it appears not possible to define a universal and invariable hierarchy of explicative principles, rather they evolve in combination with new ascertained facts and with the structure of our accepted theories of knowledge (Baumann, 2005).

2.2 Limits of the abductive defence of realism

Turning back to the main topic of this paper, in light of the previous analysis we have now many elements that make it possible to consider scientific realism a controversial explicative conception. Within the realist argument it is now clear that two epistemic conditions are not sound: a) the assumption of a non-epistemic conception of truth, and b) the presence of the epistemic criteria characterizing the evaluative moment proper of every explicative process.

In the previous section (1.2), it was possible to realize how, for a scientific realist, an ontological and non-epistemic conception of truth plays a fundamental role into furnishing an explicative justification for the scientific success. As we have seen, the explicative claim advanced by scientific realists is made possible by the preliminary acceptance of a condition of independence between truth-reference and epistemic assumptions involved by scientific knowledge. The request, advanced by scientific realists such as Psillos, concerning the epistemic independent status of truth values ascribable to our best theories, underestimates the proper role of the evaluative moment (that is the adoption of some explicative standards) required to complete an abductive reasoning.

In light of this, a question emerges: how could a realist justify the explicative significance of a *truth value*, independently of every epistemic assumption concerning what should be considered explicative? In other words: how can we consider a set of explicative standards, characterized by an objective and ontological value as always preferable above all others?

This question configures a sort of *transcendental* argument for realism [7]. What kind of criteria makes it possible to select scientific realism as best explanation of the factual success of science? The selection between a multitude of different explicative proposals requires to be justified and, if not in epistemic terms, how? Now the burden of the proof passes in the hands of scientific realists.

Resuming, the problem individuated within the explicative conception of scientific realism is defined by the contrast between two assumptions:

1. scientific realism, in its abductive acceptation, involves a substantial and non-epistemic conception of truth;

[7] An argument concerning the transcendental condition of truth in realism is analyzed by Leplin, 1984.

2. every unequivocal abductive reasoning involves an epistemic evaluative moment concerning the adoption of conventions, conjectures and postulates regarding the definition of what should be considered explicative.

The assumption of both these two statements opens the door to the subsequent question: how to defend the explicative statement of a theoretical hypothesis independently of whichever epistemic condition? The deficiency in to furnish an answer to this question configures an important limit of the explicative claim of realism. The explicative supremacy of scientific realism may be also questioned in force of its metaphysical character and its related not-observational nature. Without the possibility to establish any empirical confirmation, the process of hypothesis selection involved by abductive reasoning, should be drawn only on the ground of the explanatory principles we choose to adopt. A condition that elude the second criterion introduced by Peirce concerning the observational character of any explanatory process.

Furthermore, the metaphysical acceptation of reality, beside to be an unobservable assumption, also appears unable to furnish more empirical predictions than a not-metaphysically committed conception do. The possibility of a scientific progress, that is the possibility to discover new theories more confirmed than the older, with a better structure, or with a largest empirical domain, seems to be independent from the assumption of a particular metaphysical view concerning truth values or ontological conditions [8]. For this reasons, if realism has to be evaluated as any other scientific explanation, it appears nothing but a very unsatisfactory suggestion (Parrini, 1995).

3 Conclusions

In this paper it was possible to reveal the presence of an inconsistence within the abductive argument usually advanced to establish scientific realism.

Starting from the analysis of Peirce's notion of abductive reasoning, it was possible to make explicit the distinction between two internal moments, the *generative* and the *evaluative*, both characterizing a typical kind of not-ambiguous explicative process. Moreover, following Peirce, it was possible to underling how both *rational* and *observational* criteria are involved by the evaluative process aiming to select the best explicative solution available.

After this preliminary introduction, the analysis of the explicative thesis concerning scientific success, endorsed by philosophers such as Smart, Putnam, Boyd and more recently Psillos, has made explicit the underlying abductive structure of scientific realism, as well as the role of a non-epistemic notion of truth, linking directly successfully theoretical descriptions with an independent ontological domain.

Finally, an accurate examination of the epistemic properties characterizing abductive reasoning has evidenced the untenability of an explicative defense of realism based on both a) the assumption of an abductive argumentation and b) the adoption of a non-epistemic notion of truth.

[8] This at least we choice to pass from an epistemological to a psychological context of analysis, where assumptions of this kind may influence the development of subjective motivations.

This contrast is generated by the frequently underestimated role of the evaluative process constituting any occurrence of a satisfactory explanation, that is, the result of a not ambiguous abductive reasoning. As it was shown in the last part of the work, the choice of a set of selective criteria to single out the best explicative hypothesis available is a typical process involving epistemic assumptions, contextual contingencies and is mutable with the progress of knowledge.

Concluding, the analysis of the abductive defense of scientific realism has revealed the presence of remarkable limit. The selective character of abductive reasoning invalidates any attempt to identify an explicative proposal independently from the function of a restricted set of epistemic assumptions concerning the adoption of a specific theory of explanation. Any attempt to identify a link between theoretic constructs and an ontological domain is the consequence of a typical epistemic choice concerning the relevance of a previously selected set of explanatory principles. This condition configures scientific realism as an epistemic choice between others, a circumstance that no metaphysical stance appears capable to elude.

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