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Abstract

The similarity approach stands as a significant attempt to defend scientific realism from the attack of the pessimistic meta-induction. The strategy behind the similarity approach is a shift from an absolute concept of truth to the more flexible notions of truthlikeness and approximate truth.

The aim of this paper is to understand why the concepts of truthlikeness and approximate truth have been considered as unsatisfactory to defend realism. Our thesis is that the reason of the dissatisfaction with these two concepts concerns the striclty related concept of correspondence: Within the similarity approach, the notion of correspondence plays a normative role in theory selection whereas it should play only a regulative one.

The similarity approach (Oddie, 1986; Niiniluoto, 1987) stands as one of the most significant examples of the attempts emerged within the realist epistemology to respond to the challenge of the pessimistic meta-induction (Laudan, 1981). A key feature of the similarity approach is a sharp shift in the formulation of the concept of truth. As concisely put by Niiniluoto, the strategy has been to move from "the strict concept of truth" to the "more flexible notion of truthlikeness and approximate truth" (Niiniluoto, 1997, p.547). After Popper's unsuccessful attempt (1963), the similarity approach has been intended to provide a systematized conceptualisation of the realist hypothesis that though scientific theories are typically false, their increasing success indicates an increasing degree of similarity to the true state of affairs.

Some authors, among which Boyd (1984), Newton-Smith (1981) and Niiniluoto (1984a), thought that the shift in the understanding of the concept of truth could rescue the realist thesis that science delivers truth from the attack of the pessimistic meta-induction (Laudan, 1981). Following Laudan's (1984b) critical argumentation, a stream of thought emerged according to which the shift has failed to provide a cogent answer and it remains an open question whether the increasing success of scientific theories warrants that they are closer to the truth.

The goal of this article is to disentangle the reasons why the concepts of truthlikeness and approximate truth have been perceived as unsatisfactory to defend realism. In particular, we limit ourselves to investigate the role that these two concepts play within the similarity approach. The thesis that guides our work is that the difficulties with the concepts of truthlikeness and approximate truth should be searched in the role that the strictly related notion of correspondence plays in theory selection. Before illustrating our thesis, we will briefly consider the basic assumptions that underlie the similarity approach.

The similarity approach, as formulated by Niiniluoto (1987), is intended to provide a measure of how similar a description delivered by a scientific statement is to the true state of affairs. To this end, Niiniluoto introduces what he calls the *degree of truthlikeness*, $M(g, h_*)$, of a scientific statement g in a given language L. The

degree of truthlikeness measures the distance of g from the truth h_*. This notion of truthlikeness is a basic tool: it is adopted in theory selection and in the explanation of the success of science. Concerning the decision on which of two rival theories should be selected, the notion of truthlikeness dictates that the theory that should be selected is the one that is closer to the truth. Concerning the explanation of the success of science, the notion of truthlikeness is used to state that every new theory that is preferred to its predecessor represents a step toward truth and therefore a genuine progress.[1]

The similarity approach raises a major epistemological issue. It is what Niiniluoto calls the "epistemic problem of truthlikeness" (1987, p. 263). The truth h_* to which a scientific statement tends is typically unknown and what can be reached is an *estimated degree of truthlikeness*, $ver(g/e)$, which measures how close a statement g is to truth h_* on the basis of some empirical evidence e. The measure ver has therefore an empirical nature and is directly related to the success of the statement g. In this sense, ver allows one to select a theory and to evaluate its progressive character directly on the basis of empirical evidence. As a consequence, the claim that a theory represents a genuine progress with respect to its predecessor can be disconfirmed by further evidence. On the basis of this observation, Niiniluoto concludes that the estimation of truthlikeness "is neither more nor less difficult than the traditional problem of induction" (1987, p. 263).

Whereas Niiniluoto admits that there are no infallible methods to infer the approximate truth of a theory from its empirical success, he makes the very hypothesis that:

> *pragmatically successful theories have a high degree of estimated truthlikeness, and their continued success can be* explained *by the* hypothesis *that they in fact are close to the truth at least in the relevant aspects–* (Niiniluoto, 1980, p. 448).

In other words, Niiniluoto regards the high degree of estimated truthlikeness of a theory as a reliable indicator of its genuine correspondence to reality. Yet, this covariance between the empirical success and the genuine verisimilitude is precisely what critics, such as for example Laudan (1981), consider as a questionable assumption. Indeed, the similarity approach provides a definition of what does it mean for a theory t_2 to have a higher degree of truthlikeness than a theory t_1 as well as a method to measure the degree of truthlikeness of a theory on the basis of evidence e. Nonetheless, it is controversial if it supplies "a criterion that would epistemically warrant" (Laudan, 1981, p.31) that t_2 is genuinely more verisimilar than t_1.

Although the notion of truth is made more flexible within the similarity approach and the minimum requirement for the acceptance of a theory is only its approximate truth, the question that remains unanswered is whether truth can be inferred from empirical success. As stressed by Laudan (1981), the available historical evidence seems to indicate that the empirical success of theories does not warrants neither their genuine reference nor their approximate truth. Niiniluoto (1984a), among others (Hardin and Rosenberg, 1982), has tried to get around this problem by conceding that many past successful theories may have failed to refer while insisting that they were anyway approximately true of the world. Yet, as pointed out by Laudan, it is difficult to see how this acquiescence "in the divorce of empirical success and referential presumption" (Laudan, 1984a, p. 158) is compatible with the realist theory of scientific progress, which explains the preference among competing theories with their approximate truth and approximate truth with their better correspondence to reality.

Within the similarity approach, and within the realist epistemology more in general, the notion of correspondence plays a *normative* role: the conclusive criterion for preferring a theory t_2 to a theory t_1 is that t_2 better corresponds to reality. As

clarified above, the founding assumption of the approach is indeed that a theory that is empirically successful necessarily represents reality in a substantially correct way. In other words, the basic idea is that the very fact that a theory correctly represents reality is the best explanation of its success. However, as Niiniluoto acknowledges, the genuine correspondence to reality, measured by the function $M(g, h_*)$, "is not epistemic in any sense" (Niiniluoto, 1984b, p. 607). Due to the "epistemic problem of truthlikeness" (Niiniluoto, 1987), we have no access to truth h_* and therefore we have no knowledge of how faithfully a scientific statement correspond to the truth h_*. As we have access only to an estimated degree of truthlikeness *ver*, which cannot definitively warrant the true verisimilitude, it is hard to see how genuine correspondence can play the constitutive role that the similarity approach assigns to it.

Arguing that genuine correspondence could not play a normative role in theory selection does not mean denying that this concept can play some role. In particular, it could well have the *regulative* role of extending our knowledge beyond the limit of what can be empirically tested and thus of promoting the conception of new scientific hypotheses. In his discourse, Niiniluoto appears not to distinguish these two roles. The possible confusion can be singled out in the following passage in which he discusses the debated inference from success to approximate truth. In his response to Laudan's challenge, Niiniluoto claims that:

> [...] if we are fallibilists rather than skeptics we may admit that the realist provisional inference was warranted relative to the the available evidence e. With new evidence e' the situation has changed, since our new theory T' has a higher degree of estimated verisimilitude on e' than the old rejected theory T. This feature of gradually approaching to the truth by revising theories indicates that "inference to the best explanation" is not infallible, but it does not prove it to be an unreasonable procedure for a fallibilist realist. Indeed, by present lights we can claim that the old theory T was not referring because we have reached the new theory T' by applying the same method with respect to the new evidence e'–(Niiniluoto, 1984b, p. 604).

In other words, Niiniluoto states that the estimate of the degree of correspondence of a theory to reality is modified as new evidence is gathered and that it is reasonable to think that this procedure of revision determines a gradual approach toward the objective truth. In principle, it is reasonable to think that the idea of approaching the truth can play a role within the process of theory revision: The problem is to understand clearly what role it plays.

The controversial issue within Niiniluoto's argumentation is that verisimilitude is presented both as an empirically revisable criterion and as an *a priori*, objective principle. On the one hand, the acceptance of a theory is decided on the basis of the empirical evidence and thus on the basis of an *a posteriori* criterion. On the other hand, this acceptance is justified on the basis of the *a priori* criterion of the actual closeness of the selected theory to the true structure of the world. The reason of this superposition is twofold. On the one hand, verisimilitude must be empirically revisable in order to respond to the challenge of the pessimistic meta-induction. On the other hand, verisimilitude has to play the role of an *a priori* principle because no realist explanation of the progress of science can be defended without the assumption that successful theories are, "at least in the relevant aspects" (Niiniluoto, 1980, p. 448), actually close to truth.

The problem is that the notion of genuine verisimilitude cannot play the two roles. As genuine verisimilitude is epistemically inaccessible, it can, at most, play the role of an ideal that suggests promising research directions along which new theories can be devised. These theories are then selected on the basis of their degree

of estimated truthlikeness, which cannot definitively warrants that this selection is really a step toward that ideal. This is why the claim that a theory is genuinely verisimilar should be made only in a regulative sense and it should not play a role in the selection of the theory itself. In this regulative sense, an objective characterization of verisimilitude, that is, as correspondence to the facts, can be rightly advocated. As sharply remarked by Peter Urbach, the question whether a scientific statement is true of the world or not is indeed an "*objective* matter" (Urbach, 1983, p. 274) and any interesting account of truthlikeness is necessarily associated with the feature of objectivity. As he notes, the notion of verisimilitude developed within the similarity approach does not fulfill the requirement of objectivity. First, the measure of the similarity between the structure described by a scientific statement and the true structure of reality is relative to the available evidence e, as we have typically access to $ver(g/e)$ rather than to $M(g, h_*)$. Second, as Urbach remarks, the properties that are considered relevant in the assessment of the verisimilitude between structures are "strongly influenced by our constitution, our language and culture" (Urbach, 1983, p. 275). Niiniluoto is fully aware of this critique as he admits that a commonly raised objection against the similarity approach to verisimilitude is precisely that "it does not make verisimilitude completely objective or purely logical" (Niiniluoto, 1984b, p. 609).

A key to understand this lack of objectivity is the superposition of the regulative and the normative role of the notion of genuine verisimilitude. As pointed out by Urbach, the theory of truthlikeness proposed by Popper fulfills the requirement of objectivity. The reason is that Popper clearly made a distinction between the regulative and the normative role of the notion of genuine verisimilitude by clarifying that "we have no criterion of truth" but that we are "guided by the idea of truth as a *regulative principle*" (Popper, 1963, p. 226).

If the ontological presumption of the genuine correspondence to reality enters in the empirical sphere and plays a normative role in the selection of a scientific theory, it looses its objective character and it is challenged by the pessimistic meta-induction. It looses its objective character because its assessment eventually depends on the evidence and on our intuitions. As a consequence, it can be disconfirmed at any moment by new evidence and by a change in our attitudes. On the contrary, intended regulatively, verisimilitude is fully objective and it is not undermined by the pessimistic meta-induction. In this case, verisimilitude is an ideal that could help us evaluating how far we are in the understanding of Nature. In this sense, verisimilitude is not questioned by falsification because, as an ideal, it remains as such whatever counter-examples are gathered and whatever change of perspective we go through.

In short, a reasonable solution to insure that genuine verisimilitude remains objective and to protect it from the pessimistic meta-induction is to give to it only a regulative role. The open question is whether the proponents of the similarity approach are ready to renounce to its normative role.

Notes

[1]Barrett (2008) has recently provided an account of scientific progress that reverses the one provided within the similarity approach. Rather than defining what it is meant for a theory to be closer to truth than a rival one and then qualifying scientific progress as an evolution toward truth, he starts from the pragmatic assumption that science advances by eliminating errors and then he characterizes truth as a process of refinement of scientific theories *via* the "elimination of error from our current best descriptions" (2008, p. 217).

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