

In Defense of the Notion of Truthlikeness

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Abstract The notion of *truthlikeness* (verisimilitude, approximate truth), coined by Karl Popper, has very much fallen into oblivion, but the paper defends it. It can be regarded in two different ways. Either as a notion that is meaningful only if some formal measure of degree of truthlikeness can be constructed; or as a merely non-formal comparative notion that nonetheless has important functions to fulfill. It is the latter notion that is defended; it is claimed that such a notion is needed for both a reasonable backward-looking and a reasonable forward-looking view of science. On the one hand, it is needed in order to make sense of the history of science as containing a development; on the other, it is needed in order to understand present-day sciences as containing knowledge-seeking activities. The defense of truthlikeness requires also a defense of two other notions: *quasi-comparisons* and *regulative ideas*, which is supplied in this paper as well.

Keywords Truthlikeness · Approximate truth · Popper · Quasi-comparison · Regulative idea · Correspondence theory of truth

Look at the following three statements: (1) ‘The sun is shining from a blue sky’, (2) ‘It is somewhat cloudy’, and (3) ‘It is raining.’ Look then at these: (1’) ‘The bus leaves at 18.30’, (2’) ‘The bus leaves at 18.40’, and (3’) ‘The bus leaves at 19.00.’ In both cases, it seems natural to say that the content of the second statement is more like the content of the first than that of the third is. This implies that *if* the first statement is true, *then* the second statement approximates truth better than the third. Therefore, it might also be said that the second statement has a higher degree of truthlikeness than the third. Examples can easily be multiplied. The notion of truthlikeness cannot possibly be a completely meaningless notion.

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At least not for *singular indicative statements*. But I think it is also meaningful to speak of different degrees of truthlikeness in relation to *universal hypothetical statements*. For instance, look at this statement: ‘For all macroscopic bodies it is the case that: if such a body is falling towards the earth, then the relationship between the time duration of the elapsed fall and the distance fallen can be calculated by Newtonian mechanics.’ I regard it as being more truthlike than the next: ‘For all macroscopic bodies it is the case that: if such a body is falling towards the earth, then the relationship between the time duration of the elapsed fall and the distance fallen can be calculated by Galilei’s law for falling bodies.’ Moreover, I think it sometimes meaningful to speak of whole *theories* as having different degrees of truthlikeness. For instance, I would claim that the theory of special relativity (Newton’s laws with Lorentz transformations) is more truthlike than Newtonian mechanics (Newton’s laws with Galilei transformations).

1 Two-Valued Logic and Truthlikeness

Two-valued logic—the view that statements and theories should be regarded as simply either true or false—dominates much thinking, and that I find natural. However, it should not be allowed to dominate all areas, especially not thinking about the development of science. Here, even relations between *false* theories are important to consider. This is the central claim of this paper.

My point of departure is Karl Popper and the notion he has given three different labels: ‘truthlikeness’, ‘verisimilitude’, and ‘approximation to truth’. Quotations apart, I will mainly use ‘truthlikeness’. According to Popper, false theories can, despite being false, differ in degree of truthlikeness. Let me start with a quotation:

I have in these last sections merely sketched a programme [...] so as to obtain a concept of *verisimilitude* which allows us to speak, without fear of talking nonsense, of *theories which are better or worse approximations to truth*. I do not, of course, suggest that there can be a *criterion* [emphasis added] for the applicability of this notion, any more than there is one for the notion of truth. But some of us (for example Einstein himself) sometimes wish to say such things as that we have reason to conjecture that Einstein’s theory of gravity is *not true*, but that it is a *better approximation to truth* than Newton’s. To be able to say such things with a good conscience seems to me a major desideratum of the methodology of the natural sciences. (Popper 1972, 335)

Unfortunately, such a notion of approximation to truth, truthlikeness, is very much absent from contemporary philosophy and history of science. I do not, however, think that the dominance of two-valued logic is the only factor behind this absence. Other factors will be presented in Sects. 2, 3 and 4: (2) the notion of truthlikeness is often falsely regarded as part of Popper’s principle of falsification, (3) often not kept distinct from subjective (or epistemic) probability, and (4) often falsely regarded as necessarily being a *formally* definable measure. In Sects. 5, 6, 7 and 8, Popper’s *non-formal* notion of truthlikeness is defended.

The view to be argued for makes the popular pessimistic meta-induction (i.e., theory₁ turned out to be false, theory₂ turned out to be false, ..., theory_n turned out to be false; hence all theories will turn out to be false) an uninteresting case of induction—even if true.

Why? Because it is not the falsity, but the truthlikeness of theories that is of interest when looking at the history of science.

2 The Principle of Falsification and Truthlikeness

Popper first became famous when he proposed his principle of falsification as the means by which it is possible to draw a sharp line between scientific and metaphysical enterprises. This principle is now since long rejected in the mainstream philosophy of science. Be it regarded as superseded by Thomas Kuhn's very anti-Popperian views and notion of paradigms, by Imre Lakatos' to some extent pro-Popperian notion of research programs, or by something else such as strong social constructivism. I have no qualms about this rejection. Even more, I have myself argued that there are non-Kuhnian and non-Lakatosian arguments that are sufficient for a rejection (Johansson 1975, 1980). This paper is meant to be in complete agreement with an abandonment of Popper's principle of falsification.

To think that the whole of Popper's philosophy of science stands or falls with his much discussed demarcation principle is a serious mistake. In particular, his notion of truthlikeness does, as I will show, survive it. That is, *this paper accepts the rejection of Popper's principle of falsification, but does nonetheless defend his notion of truthlikeness*; more precisely, his last and non-formal notion.

3 Subjective Probability and Truthlikeness

A third mistaken way of dismissing the notion of truthlikeness is to think that the extensive discussions around subjective (epistemic) probability has made Popper's notion superfluous. Popper was aware of this possible mistake from the start, and tried at once to avert it. He pointed out that whereas subjective probability is meant to conform to the probability calculus, truthlikeness is not (Popper 1963, 219, 228–237, 399–404). I will, however, briefly explain the difference without bringing in the probability calculus.

Look again at the introductory three statements: (1) 'The sun is shining from a blue sky', (2) 'It is somewhat cloudy', and (3) 'It is raining.' To say, as I did, that *if* the first statement is true, *then* the second statement has a higher degree of truthlikeness than the third, does *not* mean that the second statement is epistemologically more likely to be wholly true than the third one. Look at the following pair of statements:

Ia *Probably*, the statement 'It is somewhat cloudy' is true

Ib *Probably*, the statement 'It is somewhat cloudy' has only a high degree of truthlikeness

Both statements hint at different implicit *coherence relations* between the statement 'It is somewhat cloudy' and related evidential statements. The fact that (Ia) contains the notion 'truth' and (Ib) the notion 'truthlikeness' does not change this fact. Look next at this pair:

IIa The statement 'It is somewhat cloudy' is true

IIb The statement 'It is somewhat cloudy' has only a high degree of truthlikeness

At face value, these statements describe two different kinds of relations between the statement 'It is somewhat cloudy' and a fact in the world. That is, they do not hint at

evidential coherence relations, but describe what might be called semantic-ontological correspondence relations. They are about the relationship between a statement (a truthbearer) and something that exists independently of the statement (a truthmaker).

Let it be noted that a fact which has not yet been described is—so far—only a *possible* truthmaker; there has to be a corresponding truthbearer before it can become an actual truthmaker. This means that if all truthbearers are mind-dependent (as I take statements and beliefs to be), then truth is not mind-independent (Ingthorsson 2006). I think, like Ingthorsson, that the wide-spread belief that truth is mind-independent blocks many philosophers from accepting the correspondence theory of truth.

All complete denials of a correspondence notion of truth such as those of the coherence theory, the pragmatic theory, and the warranted assertability theory of truth, and even deflationary views of truth, claim that the distinction between truthbearers and truthmakers that I have used is fishy. However, I will here rest content with only reaffirming that the notion of truthlikeness that I defend makes sense only within a correspondence theory of truth. On the other hand, I suspect that many philosophers' denial of the correspondence theory rest on the mistaken view that it, in contradistinction to the other views, does not admit of degrees of truth. But just as one may speak of more or less coherence between statements, of statements that are more or less useful, and more or less warranted, my view is that one may speak of statements that are more or less truthlike.

On my analysis, truthlike statements or beliefs (truthbearers) have some kind of partial correspondence relation to a fact (truthmaker). With respect to pictures of a real person, it is often easy to distinguish between a complete and a partial resemblance/correspondence between a picture and a veridical perception of the person. Of course, verbal statements do not allow the same kind of literal talk of resemblance and correspondence relations as pictures do, but I think that the examples presented in the very first paragraph of the paper show that talk of partial resemblance makes sense even in relation to singular indicative statements, and that such talk can be generalized to universal hypothetical statements and whole theories, too.

It should be noted that in a strict sense there can be no degrees of *falsitylikeness*, since there are no non-existent facts to which a statement can correspond. This notwithstanding, one may of course use the expression 'being falsitylike' as a metaphor for having a low degree of truthlikeness; and also talk about *falsity-content*, which Popper in fact does.

At the end of a sequence of all possible progressively better and better approximations to truth, there is of course simply truth. But truth does not belong to the sequence itself, even though it delimits it. Truth is in this sense analogous to a mathematical limit value. The number sequence $1/2$, $1/4$, $1/8$, and so on (with increasing n for $1/2^n$) has zero as its limit value, but zero does not belong to the sequence. No n whatsoever gives rise to the number zero, but the larger the n is (the higher the truthlikeness is), the closer to zero (the truth) the sequence comes.

To introduce degrees of truthlikeness is to introduce a *complement* to the simple binary opposition between being true and being false. It is a bit—but only a bit!—like switching from talking only about long and short distances to talking about the relative lengths of various distances. The difference is that, unlike length, truthlikeness cannot be given a strict proper metric or ordinal measure; this is the topic of the next section.

4 Truthlikeness as a Formally Defined Measure

As emphasized in the Popper quotation in the first section, Popper does not claim that he can lay down an epistemological *criterion* for determining the degree of truthlikeness of a theory. But this view is quite consistent with an attempt to construct a *formally defined measure* of degree of truthlikeness. To give a formal definition of a notion and to supply a criterion for its application can be different things, and so they are for ‘truthlikeness’. Popper tried at first to deliver a formal measure/definition, but failed (see this section); and later on he realized this (see next section). This failure is the reason why even otherwise pro-Popperian philosophers dismiss truthlikeness. Here is a quotation from a Popper expert:

There are numerous criticisms of Popper’s proposals around truthlikeness, and hardly fewer attempts to improve on them. The pretentious ones take over Popper’s basic thoughts, but attempt to avoid their awkward consequences. They do not take into consideration all of the logical implications of a sentence, only the “relevant” implications. But this drastic restriction on logical derivability make them irrelevant for scientific purposes. (Keuth 2000, 199; translation by the author)

In his early thinking about truthlikeness, Popper puts forward this view:

Assuming that the truth-content [C_{T_1}] and the falsity-content [C_{F_1}] of two theories t_1 and t_2 are comparable, we can say that t_2 is more closely similar to the truth, or corresponds better to facts, than t_1 , if and only if either

- (a) the truth-content but not the falsity-content of t_2 exceeds that of t_1 ,
- (b) the falsity-content of t_1 , but not its truth-content, exceeds that of t_2 .

If we now work with the (perhaps fictitious) assumption that the content and truth-content are in principle *measurable*, then we [...] can define $Vs(a)$, that is to say, a measure of the *verisimilitude* or *truthlikeness* of a . The simplest definition will be

$$Vs(a) = C_{T_1}(a) - C_{F_1}(a). \quad (\text{Popper 1963, 233–234})$$

The *Stanford Encyclopedia of Philosophy*’s entry on Truthlikeness. It presents three different approaches in the search for a formal measure of truthlikeness, but not Popper’s last and non-formal notion, which I will present in the next section. The author, Graham Oddie, distinguishes between:

1. *The Content Approach*. This is the approach in the Popper quotation above, but the label also encompasses attempts from other philosophers to improve on Popper.
2. *The Consequence Approach*. According to it, Popper was right in thinking that truthlikeness depends on the relative sizes of classes of true and false consequences of a theory, but erred in thinking that all consequences of a theory count the same; some consequences are *relevant*, some are not.
3. *The Likeness Approach*. I quote the SEP article: “The shift from content to likeness is marked by an immediate shift from Popper’s essentially syntactic approach (something it shares with the consequence program) to a semantic approach, one which trafficks in the contents of sentences [as understood in a possible world semantics]” (Oddie 2014, Sect. 1).

Oddie finds all the three approaches wanting in some respect or other, and I agree. The present conclusion is this: seemingly, no reasonable formal measure/definition of degree of

truthlikeness can be constructed. Therefore, we have to ask: can in spite of this the notion of truthlikeness be regarded as meaningful and having a function to fulfill? My affirmative answer is defended in the sections that follow.

5 Truthlikeness as a Non-formal Notion

Here comes a quotation from an old Popper (written 1982, at the age of 80):

Another objection to my theory of knowledge is better founded, even though its impact on my theory is negligible. It is the admitted failure of a definition (of verisimilitude, or approximation to truth) which I proposed in 1963. [...] These examples [Newton vs. Copernicus & Galilei in physics, and Mendel vs. Darwin on heredity] show, I believe, that a formal definition of verisimilitude is not needed for talking sensibly about it. [...] [N]obody has ever shown that my theory of knowledge [...] is shaken in the least by this unfortunate mistaken definition, or why the idea of verisimilitude [...] should not be used further within my theory as an undefined concept. (Popper 1983, xxxv–xxxvii)

I agree with what Popper says in the quotation, but there is more to say about the non-formal notion of truthlikeness than that it is “an undefined concept.” On pain of a vicious infinite regress, all notions cannot be given a conceptual definition; there must be some undefined notions. And I can very well regard ‘truthlikeness’ as being one of them. However, such a view of the notion ‘truthlikeness’ does not rule out the need for elucidating it by relating it to some kindred notions. Popper does this to a very small extent, and I will in the next two sections elaborate on his views a bit more.

In my opinion (and I think in the old Popper’s, too), the non-formal notion of truthlikeness is both a necessary and a sufficient condition for making sense of the claim that the development of science contains a knowledge development. This view implies that some kind of historical comparisons have to be possible, but Popper does after his rejection of a formal measure/definition of truthlikeness never discuss what such comparisons are like. I shall try to remedy this neglect by introducing a notion of *quasi-comparisons* (Sect. 6); but I will also point out that this notion aligns well with some views explicitly put forward by Popper.

The old Popper regards the notions of both truth and truthlikeness as *regulative ideas*, but he says very little about what regulative ideas are, and why they are needed. This neglect I shall try to remedy, too (Sect. 7). Doing so makes it easier to regard research as a truth-seeking activity.

6 Truthlikeness as Based on Quasi-Comparisons

People who travel a lot, spontaneously form opinions about different countries being, for example, more or less rich, more or less egalitarian, and more or less non-corrupt. If they visit the same country in different decades, they often form opinions also about changes or non-changes in such respects. That is, they take it for granted that there are various one-dimensional non-numerical ordinal scales along which it makes sense to place the different countries, as well as one country at different times. Philosophically seen, each such scale presupposes the meaningfulness of two different relation predicates: ‘more-than’ (or the

converse ‘less-than’) and ‘equal-to’. Think, for instance, of statements such as ‘ C_1 is richer than C_2 ’ and ‘ C_2 and C_3 are equally rich’.

Normally, comparisons of this kind are not only non-quantitative and imprecise in the sense that the reasoning used is only implicit, they are also from a data point of view unsystematic, i.e., are cases of so-called ‘anecdotic observation.’ Nonetheless, it makes sense to discuss such comparisons and be prepared to make revisions. From the perspective of our modern world, which is permeated by scientific comparisons based on quantified and operationalized concepts, they might be called *quasi-comparisons*. Earlier, they were simply comparisons.

Likewise, many people who read about the history of science form opinions—based on quasi-comparisons—about there being at a certain time different knowledge levels in different countries, and that the knowledge level can change over time. For instance, in my opinion, it is almost impossible to read about the history of astronomy without coming to the conclusion that mankind today knows more about the earth’s place in the universe than ever before.

Social scientists have, on their own initiatives or by being so asked by organizations or institutions, tried to make the non-formal estimations of degree of poverty, inequality, and corruption more valid and more reliable by constructing various kinds of numerical indexes or coefficients. In the kind of cases mentioned, the most famous are Gross national product per capita, the Gini coefficient, and the Corruption perceptions index, respectively. Of interest in the philosophical context now at hand is only what they have in common.

All these operationalizations contain in their constructions a number of different numerical factors or dimensions, out of which a one-dimensional numerical ordinal scale is constructed. Each point on the latter scale can be formally defined as a weighted sum of all the factors involved. On such a scale, countries can then be ranked as being more or less rich/egalitarian/non-corrupt. The question now to be asked is: what is the relationship between the original non-formal and non-operationalized notions, e.g. ‘richer-than’, and the corresponding operationalized notions, e.g. a formal measure of richer-than? I will make three claims.

The first is that the primitive non-formal notions cannot possibly be completely meaningless, since without them there would be no point of departure for the operationalizations.

The second is that the operationalizations do *not* make the primitive non-operationalized notions superfluous. Normally, operationalizations contain several steps that are somewhat conventional, and competing proposals of how to proceed with the construction need to be discussed. Sometimes the changes can be quite radical, as when United Nations Development Programme exchanged the economists’ GNP per capita for their own Human Development Index (which also takes into account things such as life expectancy and education). As a matter of fact, it is possible to discuss what operationalization and formal definition of a pre-given non-formal notion is the best one. This would not be possible if each and every operationalization is a self-enclosed semantic unit.

My third claim is that the two earlier claims imply that even if there is no operationalization at all in sight for a non-formal notion, it makes nonetheless some sense to rank the relevant entities by means of only the quasi-comparisons that constitute the primitive non-formal notion.

The last claim is of great importance for the notion of truthlikeness. According to Popper’s first formal approach, the content approach (see Sect. 4), truthlikeness is defined as the difference between two factors: a theory’s truth content and its falsity content. The seeming impossibility of constructing a good formal measure/definition of truthlikeness

should not, however, according to the last claim, make us dismiss the whole notion of truthlikeness. That would really be, as the saying goes, to throw the baby out with the bathwater. Even if the non-formal baby will never grow into a formal adult, it is certainly wrong to kill it.

The views I have put forward align well with views that Popper once put forward when making a whole-sale criticism of what he calls ‘criterion philosophies’, i.e., “the view that we must have criteria [or operationalizations] in order to know what we are talking about” (Popper 1966, 371–374). Here are some of Popper’s own words:

Admittedly, a criterion – a definite method of decision – if we could obtain one, might make everything clearer and more definite and more precise. It is therefore understandable that some people, hankering after precision, demand criteria. And if we can get them, the demand may be reasonable.

But it would be a mistake to believe that, before we have a criterion for deciding whether or not a man is suffering from tuberculosis, the phrase ‘X is suffering from tuberculosis’ is meaningless; [...] or that, before we have a criterion of truth, we do not know what we mean when we say of a statement that it is true.

Thus those who insist that, without a criterion—a reliable test—for tuberculosis, or [...] truth, we cannot mean anything by the words ‘tuberculosis’ or [...] ‘true’, are certainly mistaken. In fact, construction of a battery of tests for tuberculosis [...] comes *after* we have established—perhaps only roughly—what we mean by ‘tuberculosis’. (Popper 1966, 372)

7 Truthlikeness as a Regulative Idea

Most people take it for granted that we can search for knowledge, but how is such a search possible? In his dialogue *Meno*, Plato puts forward the so-called ‘paradox of Meno’, which I will state as follows. Either we think we have knowledge of something, or we think we have not. In the first case, searching for the knowledge is not only superfluous, it is impossible, since one cannot search for what one think one has. In the second case, it is impossible since one does not know what to search for; one can look around haphazardly but not search in the literal sense. Leaving Plato’s presumed solution (that all knowledge is innate in immortal souls) aside: how to answer the paradox from a modern naturalist perspective?

I think we have to cut the Gordian knot, and simply state that our language as a matter of fact contains a special kind of notions that can put us on the track for knowledge, even if only somewhat haphazardly. I will, like many before me, call them ‘regulative ideas’. By means of such notions regulative *principles* can be formulated. For Popper (and all fallibilists) the problem is enhanced, since, in contradistinction to Plato, he thinks we cannot even be sure that we have found a truth when in fact we have:

So one great advantage of the theory of objective or absolute truth is that it allows us to say that we search for truth, but may not know when we have found it; that we have no criterion of truth, but are nevertheless guided by the idea of truth as a *regulative principle* (as Kant or Peirce might have said). (Popper 1963, 226)

Kant makes a distinction between two kinds of concepts: the *constitutive categories* of understanding and the *regulative ideas* of reason. The former explain to him the possibility of synthetic a priori knowledge, and the latter (which cannot constitute any knowledge at

all) only encourage further research. What Popper is implicitly saying can be stated thus: modern fallibilist epistemological realism needs a corresponding distinction between *description-constitutive* notions and *research-regulating* (regulative, for short) notions. To both Kant and Popper, a regulative idea is a notion that helps us to search for knowledge without itself being able to describe any knowledge.

By means of the regulative ideas *truth* and *truthlikeness*, we can formulate the regulative principles ‘seek the truth’ and ‘seek truthlikeness’, respectively.

In this century, I have so far found only one paper (Piscopo and Birattari 2010, 379–386) that regards the notion of regulative ideas as being of importance for the discussion of truthlikeness. It ends as follows:

In short, a reasonable solution to protect truthlikeness 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 [Oddie’s likeness approach] are ready to renounce its constitutive role [meaning here its role as a criterion for theory selection]. (ibid., 385)

When Popper introduces the notion of truthlikeness, he writes as if truth is a regulative idea, but that there are criteria for truthlikeness (Popper 1963, 226). However, he nonetheless puts forward a sentence such as ‘Our idea of approximation to truth, or of verisimilitude, has the same objective character and the same ideal or regulative character as the idea of objective or absolute *truth*’ (Popper 1963, 234). In the light of his later rejection of a formal measure of truthlikeness, it should be clear that the old Popper regards truthlikeness in the same way as he always has regarded truth, i.e., as a criterionless regulative idea.

On both the first (criterial) and the second (non-criterial) view of truthlikeness, Popper is implicitly saying to researchers: seek the truth, but expect to find only truthlikeness. However, on the second view one can—and I will—also say: seek sometimes only truthlikeness, but expect nonetheless to find less of it than you imagined. This simple move makes it easy to bring in even conscious constructions of scientific idealizations into the realm of epistemological realism. Whatever the creators of the most famous of such idealizations—frictionless movement (Galilei), planets as point particles (Newton), and persons as homo oeconomicus (Neoclassical economics)—really had in mind when creating their models, they need neither have regarded the models as corresponding to facts nor as merely non-referring conceptual constructions. They could have regarded them as having some degree of truthlikeness to some kinds of facts.

This being noted, I propose that scientific idealizations should be regarded as models/theories that are *consciously* made only truthlike. As far as I can see, the empirical sciences, technology, and medicine can never rest content with purely fictional models. There must be some, if only partial, connection to the common world that, normally, we take for granted, and which we perceive and live in.

In view of the immense complexity of the phenomena that give rise to the contemporary economic crises and the global climate crisis, I find economists and climate researchers preposterous if they think they can find the true models, and I find them unscrupulous if they ask for funding merely in order to create purely fictional models. Serious action relevant research requires that the notion of truthlikeness is taken seriously.

8 Truthlikeness and Fallibilism

For Popper (and me), the notions of fallibilism and truthlikeness are naturally intertwined, but from a purely logical point of view they should be separated. As explained in Sect. 3, the notion of truthlikeness must not be conflated with the notion of subjective or epistemic probability. And only the latter notion is needed in order to formulate the kernel of fallibilism. Fallibilism may be defined thus: for any scientific theory S , in the statement ‘probably, S is true’, the term ‘probably’ should never be substituted by ‘certainly’. (If the subjective probability mentioned is given a numerical probability measure, p , ranging from 0 to 1, fallibilism means that p should never be set equal to 1.)

Of course, fallibilism applies to judgements of truthlikeness, too. In the statement ‘probably, S_2 is more truthlike than S_1 ’, the term ‘probably’ can for a fallibilist never be substituted by ‘certainly’.

But more can be said. The introduction of the notion of truthlikeness adds a specific new semantic opportunity to fallibilism.

Within the correspondence theory of truth in which this paper unfolds, the difference between the statements ‘ p ’ and ‘ Tp ’ (‘it is true that p ’) is that p is only used in the first statement, but also talked about in the second. In some very special situations, there can be pragmatic reasons to ascend to the level ‘ TTp ’, and even to ‘ $TTTp$ ’. Such an ascent, however, seems not to add any interesting semantic content. Therefore, since in principle the ascent can go on indefinitely, one should look upon this possible infinite regress as being an innocent non-vicious regress.

Similarly, taking V as a symbol for truthlikeness (verisimilitude), one might with good reasons claim that ‘ Vp ’, ‘ VVp ’, and ‘ $VVVp$ ’ has for all practical purposes the same semantic content.

What happens then if the operators T and V are combined? The statement ‘ VTp ’ looks odd. It seems to be a kind of contradiction, stating that ‘ p ’ is both true and truthlike, but the statement ‘ TVp ’ contains no similar oddity.

It says that it is true that what is described by p is only truthlike. In my opinion, this is what scientists who take fallibilism for granted should claim about their conscious idealizations, namely: ‘it is true that this model/theory (idealization) is truthlike’. Making the fallibilism explicit means stating: ‘*probably*, it is *true* that this model/theory is *truthlike*’. The last statement shows that all the three notions of *subjective probability*, *truth*, and *truthlikeness* are needed in order to make sense of all aspects of science.

9 Truthlikeness and Its Problems

The SEP article on Truthlikeness states:

We are all fallibilists now, but we are not all skeptics, or antirealists or nihilists. Most of us think inquiries can and do progress even when they fall short of their goal of locating the truth of the matter. We think that an inquiry can progress by moving from one falsehood to another falsehood, or from one imperfect credal state to another. To reconcile epistemic optimism with realism in the teeth of the dismal induction [= pessimistic meta-induction] we need a viable concept of truthlikeness, a viable account of the empirical indicators of truthlikeness, and a viable account of the role of truthlikeness in cognitive value. And all three accounts must fit together appropriately. (Oddie 2014, Sect. 4)

Oddie leaves open the question whether or not there exists a notion of truthlikeness in which “all three accounts fit together appropriately”, but he never presents and discusses Popper’s non-formal notion of truthlikeness. My answer to Oddie’s three-fold requirement is this:

- (a) The conception of truthlikeness as a regulative idea that cannot be formally defined is a viable conception.
- (b) To require explicit empirical indicators of truthlikeness is, as shown in Sect. 6, too strong a requirement.
- (c) The cognitive value of truthlikeness is that it makes sense of the views that there has been, and can in the future be, knowledge improvements.

This being stated, I would like to end as follows. Applying the notion of truthlikeness to the history and the future of science allows us to think of scientific achievements the way engineers think of technological achievements. If a technological device functions badly, engineers think they should try to improve it or invent a new and better one; if a scientific theory has theoretical problems and/or empirical anomalies, scientists should think they have to try to modify it or create a new and more truthlike theory. As in engineering it is natural and common to invent imperfect devices, it should in science be regarded as natural and common to create theories that are only truthlike.

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