

CHAPTER 4

THE EPISTEMIC PROBLEM

In the first chapter, I mentioned the difference between the *semantic* (1) and the *epistemic* (2) problem of approach to the truth, and I have dedicated the first three chapters of this book to the first problem. In the present chapter, we shall study a more practical subject, viz. the second problem and three answers to it. Let me formulate the two questions explicitly:

- (1) *The semantical problem:* “What do we mean if we claim that the theory ψ is closer to the truth than ϕ ?”
- (2) *The epistemic problem:* “On what evidence are we to believe that the theory ψ is closer to the truth than ϕ ?”

In Section 4.1, we encounter general features of the answer to (2), and in Section 4.2, we will discuss the combination of Popper’s falsificationism and verisimilitude. Kuipers’s and Niiniluoto’s answer to the epistemic problem are the subject of the Sections 4.3–4.4; the differences between the approaches of Niiniluoto and Kuipers are dealt with in Section 4.5.

4.1. GENERAL INTRODUCTION

The most important difference between the semantical and the epistemic approach-to-the-truth problem concerns our knowledge about the true theory. Defining the *meaning* of “approach to the truth” is an analytical affair; and we saw in the preceding chapters that an answer to question (1) may presuppose complete knowledge of the truth. Such an answer explains under what circumstances a theory is closer to the truth than another one. When solving the epistemic problem, however, we may not assume acquaintance with the true theory; scientists do not know the truth when carrying out empirical investigations. They must choose between competing theories, on the basis of restricted information about the truth; thus, an answer to (2) is a rule of theory-choice.

After Miller’s and Tichý’s refutation of Popper’s definition, many researchers took up question (1); and their answers fulfilled various conditions of adequacy. One such condition is the possibility to equip the definition with a suitable rule of theory-choice. Among the proposals introduced in the preceding chapters, only

Popper, Niiniluoto and Kuipers answered the epistemic question. Popper (1963, p. 235) was convinced that his “theory of testability and corroboration by empirical tests is the proper methodological counterpart to” the idea of verisimilitude; Niiniluoto (1977) used the estimated degree of truthlikeness, based on probability distributions over all complete answers to a cognitive problem; and Kuipers (1982) proposed a rule inspired by his content definition. Adding convexity constraints, he adapted the rule to his (comparative) likeness approach. Before presenting the strategies of Popper, Kuipers and Niiniluoto, the remainder of the subsection deals with three global evaluation criteria for the rules.

4.1.1. *Evidence and Congruence between the Definition and Rule*

In the first chapter we encountered the difference between the *mathematical application* of a proposal—such as propositions, numerical vectors and so on—and the *intuitive interpretation* of these applications. Here, we must consider a similar question; it reads:

how does the paraphrase of the theories represent available evidence?

Most authors use the received, or statement view in which evidence is represented by logical consequences. Popper and Miller epitomize this traditional stand. They represent a theory as a deductively closed set of consequences of an axiom φ , $Cn(\varphi)$. If sentence e paraphrases the evidence, and corroborates the theory, then $e \in Cn(\varphi)$. Moreover, as we have seen, Popper and Miller assume that the truth is complete. We saw in Chapter 3 that Niiniluoto’s general framework represents propositional theories as disjunctions of constituents. Theories are partial answers to a cognitive problem in which the truth is one complete answer. We shall see that Niiniluoto bases his rule of evidence on the true logical consequences of all confirmed complete answers h_i .¹

Kuipers deviates from this well-trodden path as far as evidence is concerned. Convinced of the practical advantages of the Suppes-Sneed method, he claims that in a universe of logical possibilities, the true theory picks out all those logical possibilities that are also physically possible, and nothing else. In this framework, one element of the structuralist M_p -set corresponds to one logical possibility. Consequently, if the empirical evidence increases, the set of established, physically realizable structures also increases. This feature of the structuralist framework contrasts with the received view, where increase of the set of models implies decrease of logical strength and, hence, of realizable logical consequences.

Another significant question concerns the correspondence between the “order-fixing elements” of the definition and the rule. Order-fixing elements are the entities that determine the order of the definition or the rule. For instance, the order-fixing elements of the Δ -definition are logical consequences—the more true

consequences the better the theory. Thus, we expect that the logical consequences also establish the ordering of the corresponding rule. More generally, we would expect that the elements fixing the ordering when we have complete knowledge of the truth, are the same as those that settle the ordering when we have only partial knowledge of the truth. As it turns out, this does not hold for all answers to the epistemic problem.

4.1.2. *Reversible or Irreversible Rule*

Most researchers agree that the rule of theory-choice must be *revisable*—that is, in the light of new evidence, the rule must allow for the withdrawal of an old preference ordering. A more difficult question concerns the *reversibility* of the rule. The question reads whether new evidence may cause an adequate rule to reverse its previous strict preference order. Closely connected to the issue of reversibility is the question whether a rule is “*functional for approaching the truth*” (the phrase is Kuipers’s).²

DEFINITION 4.1: An epistemic rule ρ is (weakly) *functional for approaching the truth* if for all evidence e , ρ ’s preference of ψ on basis of e , $\psi <_e^{\rho} \phi$, implies $\phi \nprec_{\tau} \psi$ and leaves open the possibility that $\psi <_{\tau} \phi$.³

The reversibility question has been answered from two different angles. The first one calls on an adequacy argument, and the second uses theoretical considerations. The first argument says that in scientific practice, functional or even irreversible epistemic rules do not exist. On the contrary, scientists make progress only by conjecture and refutation; and no method evades reversibility. Niiniluoto claims “it is one of my adequacy conditions —rather than a ‘major difficulty’—that the appraisals by ver are fallible and revisable”.⁴ We shall see, however that, in addition to being *revisable*, his rule is even *reversible*. It allows for a reversal of strict preference order, if a huge stock of new experimental data points in that direction. The disadvantage of a reversible rule might be that it is inadequate for decision making.

The second point of view is based on epistemological considerations mentioned in the first chapter (p. 3). The very point of being a realist is that it is the only sensible way to explain the lasting success of science. If the rule—no matter the evidence—allows new evidence to reverse the preference order, it cannot explain the success of science. Let ϕ and ψ be competing theories, and let evidence e favour ψ . A realist explains this preference by the argument that ψ is more similar to the truth than ϕ . If, subsequently, new evidence reverses this order, then the assumption that ϕ is more similar to the truth than ψ must explain this second situation; and that would contradict the preceding truthlikeness claim. This is the argument of Laudan and Kuipers agrees.⁵ He accepts Laudan’s challenge to design

a functional or “non-frustrating” rule. The drawback of such an irreversible rule is that it is inadequate as far as scientific practice is concerned. There, as the history of the theory of light shows, preference relations may reverse in the light of new evidence. Our introduction of the rules will consider the question about the *order-fixing elements*; and subsection 4.5.3 returns to the irreversibility of the rules.

4.1.3. Complete Truth

All approach-to-the-truth proposals, except those of Kuipers, are accompanied by the assumption of the completeness of the truth; and even a modal paraphrase of Kuipers’s proposals fulfils this assumption. As to the rule of theory-choice, however, this presupposition needs some reflection. At first sight, the complete truth assumption seems harmless. Being innocuous for the definition, why should it hamper the answer to the epistemic problem? Some more reflection, however, reveals that the rule must provide an answer, for all pairs of theories, even if formulated in an indeterminate conceptual framework without a complete truth. After all, due to theoretical terms, there may be epistemic contexts in which the truth of the combination of two languages is incomplete, e.g. a combination of ether and phlogiston. Thus, some propositions may lack a definite truth-value. Although Niiniluoto extends his *definition* such that it handles indeterminate languages he does not elaborate his *rule* in the same direction.⁶

Why, one might ask, must an epistemological rule decide between theories if the truth is indefinite? Suppose we live in the age of phlogiston, and we know that the bulk of observations corroborates or confirms the phlogiston theory. Only a few anomalies occur, but the phlogiston theory is superior to its predecessor. Consequently, we conclude that it “has more truth in it” than previous theories about combustion. We are convinced that new evidence will not reverse the present preference order, and hopefully new refinements, such as the negative weight of phlogiston, will bring us again closer to the truth; but what is the content of the true theory in the phlogiston framework? As far as we know now, disappointingly meagre. It primarily claims that phlogiston does not exist. As the subject of “phlogiston has negative weight” lacks a referent, the sentence does not have a definite truth-value. The rule of theory-choice, however, must order two theories within the phlogiston-oxygen framework where some sentences lack a truth-value. Thus, our conclusion runs as follows. In contrast to the context of the definition, in the epistemic context an adequate rule of theory-choice must inevitably deal with indeterminate languages. If a rule of theory-choice accompanies a truthlikeness definition, it must cope with the situation in which the truth is incomplete. Recently, Niiniluoto has elaborated his point of view regarding meaning variance and truthlikeness.⁷

I end this section with a short remark about concept formation. Strictly speaking, it is not the epistemic rule that has to solve the problem of language variation. In the comparative case, the question whether new evidence has to lead to a new conceptual framework rather than to the formulation of a new theory in the old framework, is beyond the scope of the rule. The rules allow us to choose between two or more existing theories, which together settle the conceptual space; the rule is rather part of the context of justification, than of the context of discovery. How new evidence leads to theories using new concepts is an interesting question that must be kept for another occasion. Anyway, it is rather unlikely that an arbitrary combination of two frameworks always yields a complete truth; and that rules based on a complete truth will not be generally applicable.

4.2. POPPER

Popper's methodological recommendations about falsification precede his ideas about verisimilitude. The former appeared as early as 1935, the year in which *Logik der Forschung* appeared, whereas the latter developed after Popper's conversation with Tarski about Tarski's truth definition and appeared in *Conjectures and Refutations* (1963). The question arises whether these notions match.

First we deal with Popper's own answer. Popper's somewhat rhetorical formulation of the epistemic problem reads: "how do you know that the theory t_2 has a higher degree of verisimilitude than the theory t_1 ?" His answer is "I do *not* know—I only guess. But I can examine my guess critically, and if it withstands severe criticism, then this fact may be taken as a good critical reason in favour of it (his italics)."⁸ According to Popper the claim " t_2 is more verisimilar than t_1 " is falsifiable.

Niiniluoto formulates the second possible answer to the question whether the ideas of falsification and verisimilitude match; his answer is negative.⁹ He correctly observes that, according to Popper's degree of corroboration, all falsified theories receive the minimum value -1.¹⁰ Consequently, it cannot distinguish between false but verisimilar propositions and false propositions that are not similar to the truth. Popper, however, maintained that "even after t_2 has been refuted in its turn, we can still say that it is better than t_1 ".¹¹ Since Popper's intuitions sometimes make more sense than his formal explications, it may be worthwhile to reexamine his ideas about falsification and verisimilitude.

4.2.1. Falsification and Corroboration

As Popper's original verisimilitude fails, we consider the possible relation between Popper's methodological ideas, and his revised notion of verisimilitude. Let us



<http://www.springer.com/978-1-4020-0268-7>

Refined Verisimilitude

Zwart, S.D.

2001, XI, 263 p., Hardcover

ISBN: 978-1-4020-0268-7