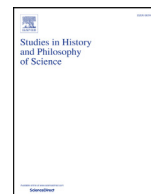




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Discussion

Scrutinizing thing knowledge



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ABSTRACT

In his book *Thing Knowledge* Davis Baird argues that our accustomed understanding of knowledge as justified true beliefs is not enough to understand progress in science and technology. To be more accurate he argues that scientific instruments are to be seen as a form of “objective knowledge” in the sense of Karl Popper.

I want to examine if this idea is plausible. In a first step I want to show that this proposal implies that nearly all man-made artifacts are materialized objective knowledge. I argue that this radical change in our concept of knowledge demands strong reasons and that Baird does not give them. I take a look at the strongest strand of arguments of Baird’s book—the arguments from cognitive autonomy—and conclude that they do not suffice to make Baird’s view of scientific instruments tenable.

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1. Introduction

Scientific instruments are reified or embodied theory—this view seems to be as common as it is false. Consider the following example: In the decades around 1800 the caloric theory of heat was the state of the art in physics. Building on this theory, scientists manufactured and calibrated their sophisticated mercury thermometers with remarkable accuracy and reliability (see Chang, 2004, 57ff). However, as we see things today, the caloric theory of heat is false. This poses a problem for the received view. If instruments are reified theory, then they should not work reliably if the theory is false. Nonetheless, thermometers of the era of caloric theory work reliably according to today’s standards. Put differently, if the theory was false, scientists had no knowledge of the inner workings of thermometers; nonetheless, they manufactured them with great sophistication and precision. How was this possible?¹

I will examine one possible answer to this question, which was proposed by Davis Baird in his book *Thing Knowledge*. In his answer to the question of how reliable instruments can be produced without a reliable underlying theory, Baird proposes a radical

departure from our accustomed concept of knowledge. Let’s call knowledge, conceived as something like justified true belief, *subjective knowledge*. Baird argues that subjective knowledge is not sufficient for understanding scientific and technological progress. Theory alone, as something that is subjectively known by scientists, is not the only stimulus that makes scientific and technological progress possible. The impetus can come from the instruments themselves, and they frequently trigger the elaboration of better theories and instruments. This is why Baird complements the concept of subjective knowledge with a liberalized version of Karl Popper’s notion of *objective knowledge*. His central claim is that instruments themselves are to be understood as a form of material objective knowledge.

Recent interest in this proposal seems to make a detailed assessment of Baird’s argument called for.² It would be worthwhile to examine those discussions of Baird’s ideas in detail but for lack of space I will restrict my discussion to Baird’s book. Even here I will concentrate only on one point, namely how reliable instruments can be manufactured without a reliable theory. Therefore it is necessary to omit many interesting points, for example, Baird’s extensive discussion of numerous case studies or his creative re-description of the history of instrumentation in science. Although

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¹ Thermometers are obviously not the only example of this phenomenon. Others include e.g. the pulse glass, the telescope or the microscope.

² See for example Pitt (2007), Charbonneau (2010) and Gelfert (2013).

there is much to be found in *Thing Knowledge* that is interesting and important, I will argue that in its present form the central claim—that instruments are material objective knowledge—does not withstand critical scrutiny.

In the next section I portray the notions of “objective knowledge” and the connected concept of “world 3”. In Section 3 I briefly summarize Baird’s account of scientific instruments. In Section 4 I pose a general problem for Baird’s account, namely, that his view of objective knowledge implies that nearly all man-made artifacts are objective knowledge. Baird could bite the bullet on this but—at least in my opinion—this radical change of some of our most basic epistemological concepts calls for strong and compelling reasons. In Section 5, I argue that there are no such reasons to support the view of instruments as objective knowledge.

2. Objective knowledge and world 3

Let us begin with Popper’s view. He argues that our universe is divided into three worlds. World 1 is that of physical things like stones, houses, stars, energy and the like. World 2 consists of mental or psychological items like beliefs, thoughts and so on. Finally, world 3 consists of the “products of the human mind” (Popper, 1978, 144). “Products” is to be understood more objectively here than individual thoughts in one’s head. For Popper, those products are “languages; tales and stories and religious myths; scientific conjectures or theories, and mathematical constructions; songs and symphonies; paintings and sculptures. But also aeroplanes and airports and other feats of engineering.” (Popper, 1978, 144).

This list is somewhat confusing. Why are there things like sculptures, airplanes and airports in it? Aren’t such things simply part of the physical world 1? Popper argues that things can be part of more than one world. The physical object “airplane” is of course part of world 1 *qua* physical object. But the theoretical ideas that stand behind all the particular airplanes in world 1 are not particular airplanes in the physical world but “the idea” of the airplane in world 3. The “world 3 airplane”, the thought contents that led to its manufacturing, is embodied in all the airplanes with this building plan. To clarify this distinction, Popper speaks of the “abstract objects” of world 3, as opposed to the “concrete objects” of world 1 (see Popper, 1978, 145). Abstract objects can be embodied in concrete objects, and that is what happens for example in the case of the airplane.

To make the scope of world 3 and the connections of the three worlds clearer, Popper distinguishes three domains in world 3 (see Popper, 1974, 1050ff). There is world 3.1, which consists of the world 3 objects that are, or once were, physically realized in world 1 objects. Similarly, there is world 3.2 which consists of the world 3 objects that are or were realized in some mental process. For Popper world 3.3 is important because it comprises all thought contents that were never realized in worlds 2 or 1, but nonetheless exist in world 3. The growth of knowledge consists in the exploration of world 3.3. Scientists try to grasp world 3.3 objects and thereby try to realize them in world 2 and 1.

By introducing world 3 Popper tries to conceive of the content of thought in a way comparable to factual world 1 situations. The content of thought is there to be grasped by subjects, but it does not depend on this grasp. In world 1, stones are hard, even if nobody ever perceives them. Likewise, following its formulation, the special theory of relativity may have an implication *i* that is contained in a set of propositions, even if nobody ever discovers it. Nevertheless, given the framework of the special theory of relativity and given that this framework is true, *i* may never be subjective knowledge if no one ever forms the corresponding belief “that *i*”. But *i* is objective knowledge already, it is part of world 3.3 even if it

never is part of world 2 or 1. Objective knowledge, therefore, is “independent of anybody’s claim to know; also it is independent of anybody’s belief, or disposition to assent; or to assert, or to act” (Popper, 1968, 335). It consists of the objective contents of thought, which is out there in the world; it can, but need not be known by any subject (see Popper, 1968, 341).

A lot can be said about and criticized in Popper’s account of objective knowledge and world 3. As Baird wants to use those concepts, he has to argue on two levels: On the first level he has to give us arguments why we should adopt Popper’s terminology in the first place and on the second level he has to offer arguments why instruments should be seen as a form of objective knowledge. On the second level Baird gives plenty and indeed good arguments why we should accept instruments as a form of objective knowledge if we accept that there is something like objective knowledge. But he rarely gives an argument on the first level, why we should accept Popper’s terminology at all.

Here is one example of how those two levels are mingled together in Baird’s book. He writes that he “agree[s] with the thrust of Popper’s push for a focus on objective epistemological objects” (Baird, 2004, 129) and goes on to say that a central reason for this is that “[o]bjective epistemological objects, sentences, and things are public” (Baird, 2004, 129, my emphasis) and can be shared. Baird writes “sentences and things”, but he does not offer an argument why we should adopt Popper’s terminology in the first place, but goes straight for an argument why, given Popper’s way of speaking, we should include material things in world 3. It is certainly true that instruments can be shared and examined by different people at different times and places, but I cannot see how this is a reason for accepting the concept of objective knowledge. Recent debates in the epistemology of testimony demonstrate how the possibility of sharing epistemological items in a publicly accessible way can be discussed without Popper’s notions.³

But isn’t Baird spending several pages on arguments on the first level when he discusses one of Susan Haack’s arguments against Popper’s concept of objective knowledge? Baird here examines Haack’s arguments about the empirical basis of objective knowledge. She argues that this basis requires a conventionalism which does not fit together with Popper’s rationalism. Since psychological causes are no rational justifications according to Popper,

Popper then opts for an epistemology rooted in a world largely divorced from human consciousness. It is a world of propositions that stand in various deductive relations to one another. Humans interact with this world, examining and articulating these propositions and their relations. But, ultimately, the empirical justification for any of the basic propositions in this world of objective knowledge is a matter of conventional choice on the part of the scientific community. (Baird, 2004, 133)

Baird goes on to defend the conventionalist bit in Popper with the help of Imre Lakatos and Ian Hacking. But one might still say that Baird should not opt for an epistemology that proposes world 3 in the first place. If he does, then the problem with conventionalism arises, and then Baird’s defense of Popper is a good one. But again, this argument sets in on the second level mentioned before and not on the first one as it would have to.

In the end, at least in my opinion, Baird does not motivate the adoption of Popper’s terminology but he assumes its tenability and then goes on to show how his view of instruments fits into this framework. In the following criticism of Baird’s views, however, I will presuppose the defensibility of the concepts of world 3 and

³ For a good overview see Lackey and Sosa (2006).

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