

Article

# Philosophy Untouched by Science? Zeno's Runner, Sextus' Epochē, and More

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**Abstract:** The relationship between science and philosophy is contentious. Quine saw philosophy as continuous with science (broadly understood), but many philosophers see a dichotomy between them. The present paper discusses cases where the relevance of certain scientific findings has been denied (related to Zeno's Dichotomy paradox and to the appeal of skeptical arguments) or overlooked (one argument related to the frame problem of artificial intelligence and Nagel's "bat" argument). The results caution against overly quick dismissal of the import of science on philosophical questions, whether the latter be of a more theoretical or practical nature.

**Keywords:** Dichotomy paradox; Zeno's paradoxes; skepticism; pyrrhonism; intuition; Nagel's bat; relevance; philosophy as a way of life

## 1. Introduction

### 1.1. Background

The relationship between science and philosophy is contentious. The superstar physicist Stephen Hawking famously declared that 'philosophy is dead. Philosophy has not kept up with modern developments in science, particularly physics' [1], and the equally renowned philosopher Quine asserted that 'philosophers can [...] do no better than to adopt the standpoint of the best available knowledge, i.e., science'<sup>1</sup> [4]. Unsurprisingly, many philosophers are unhappy with such views. A variety of attempts have been made to delineate an exclusively philosophical realm. These attempts have been inconclusive, as far as I can see. For example, many have claimed conceptual analysis to be such a realm, but Thomasson [5] challenged this and argued instead that there is a distinctively philosophical realm of the normative, which in turn may be relevant for practically important sciences like positive psychology (Alexandrova [6], see [7] for a critical discussion).

In this context, a recent paper by Dietrich [8] seems relevant. It presented three case studies that Dietrich claimed to be 'powerful clashes between science and philosophy' (p. 498): Zeno's *Dichotomy* paradox, the frame problem, and Turri's paper [9] on knowledge ascription and the appeal of skepticism. According to Dietrich, each case revealed a limitation of scientific inquiry: to solve these three problems raised by philosophers, scientists supposedly must question-beggingly deploy premises and methods rejected by those very philosophers (p. 499), so that—according to him—there is a pattern of confrontations between science and philosophy which leave the philosophical point 'unfazed—indeed, untouched'.

Dietrich's paper seems particularly apt for discussion for three reasons: (a) philosophical claims that the dichotomy paradox is unsolved appear to be especially striking cases of not having kept up with science (mathematicians think that kind of problem was solved more than a century ago), so a convincing philosophical argument to the contrary could carry a lot of weight; (b) even though Zeno's paradox may be viewed as a puzzle that is interesting at most in a theoretical way, the topic of Pyrrhonism ("Skepticism"[10]<sup>2</sup>) is related to a highly practical matter, namely mental health [11]; and (c) the discussion of the frame problem is related to artificial intelligence, a particularly timely topic today.



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## 1.2. Overview of the Present Work

The present paper argues that this attempt to insulate philosophy from science fails. In particular, the charge of question-begging is unwarranted. In fact, these cases actually illustrate the importance of philosophers understanding the details of scientific work and taking its results into account. Section 2 discusses Zeno's *Dichotomy* paradox, the alleged question-begging in mathematical solutions, and how this case really shows the importance of science to philosophy. Section 3 similarly discusses the psychological appeal of skepticism. This is followed in Section 4 by notes on the frame problem and on Nagel's bat. The latter is motivated by the possible relevance of science-remote philosophy to existential issues. Section 5 expands on this (and more generally on the currently popular idea of philosophy as a way of life on the one hand and its relationship to relevant sciences—psychotherapy and positive psychology—on the other) and concludes. An Appendix A discusses some technical aspects of the empirical work contained in Turri [9].

## 2. Zeno's Paradox: Movement and Mathematics

### 2.1. The Alleged Problem and Its Solution

Parmenides held that reality is radically different from the way it appears to be (the Way of Opinion, which contrasts the Way of Truth), a philosophy that is a shocking metaphysics and epistemology, at least according to Dietrich. Among other things, this metaphysics implies that nothing moves; there is no motion. In an attempt to provide arguments for this philosophy, Zeno of Elea argued that 'while denying motion [...] led to conflicts with perception [...], asserting that motion existed [...] led to conflicts with logic—which is far worse' ([8], p. 481, original emphasis) and 'all of Zeno's paradoxes are clashes between what we seem to experience and our logical reasoning. Zeno naturally insisted that the latter takes precedence over the former, 'naturally', because he didn't want to violate the law of non-contradiction'. One of these paradoxes, often referred to as the *Dichotomy*, claims in one version that a runner, for example, Achilles, can not run from a stationary point A to another stationary point B, which is 1 km away (Dietrich uses 100 m, I find 1 km more convenient for exposition). The reasoning is that Achilles first has to cover half the distance, i.e., 1/2 km, then half of the remaining distance (1/4 km), then 1/8 km, then 1/16 km, etc., ad inf. From this, Dietrich (p. 481) concludes the following:

(\*) Achilles has to cover an infinite number of decreasing halfway distances in order to get to B. So, there is always some distance to cover before he can get to B. So, he cannot get to B.

In other words, supposedly, 'by logical reasoning, we see that he can never complete his run (because he has to cover an infinite number of half-distances)'.

According to Dietrich, the argument that "Fans of Math" used against Zeno's reasoning went like this: What Dietrich referred to as the "Z summation", i.e., the series  $\sum_{n=1}^{\infty} \frac{1}{2^n}$ , which is defined as  $\lim_{n \rightarrow \infty} \left( \frac{1}{2} + \frac{1}{4} + \dots + \frac{1}{2^n} \right)$ , but often informally written as  $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \dots$ , 'looks a lot like the progressive form of the Dichotomy (as many have noted [...]). If this summation equals 1, then by covering an infinite number of decreasing halways (as described above), Achilles can indeed race to the end of one race course. Paradox dispelled' [8] (p. 483).

### 2.2. Philosophy Untouched?

Purportedly, on behalf of Zeno, Dietrich (p. 483f) gave the following reply to the above argument:

This infinite summation cannot be carried out directly in the physical world simply because it requires an infinite number of 1/2's to be actually summed, which is impossible. We know that the Z Summation converges to 1 not because we do the actual summing, but because *in our minds*, we make the appropriate *inferential leap* from a finite amount of summing [...] to the full infinite summation [...]. But Achilles, in running from A to B can't "mentally derive" or "inferentially

leap" to B [...] Achilles is not doing math, he's running (or appears to be). [...] you are further assuming that Achilles is moving. This latter assumption, and so the former one, beg the question against me.

According to Dietrich, this reply seems decisive. In fact, it is far from being so, as will be seen next—in particular, there is no question-begging against Zeno taking place.

### 2.3. The Relevance of Science

Dietrich's on-behalf-of-Zeno reply was based on two claims: the charge of question-begging and the assertion that Achilles cannot get to point B because 'there is always some distance to cover before he can get to B', which in turn is based on the argument (\*) above. Each of these two would be decisive if true, but both claims fail. Take first the charge of question-begging: The dialectical situation is that Zeno claimed that asserting the existence of motion leads to conflicts with logic, in particular with the law of non-contradiction. So *Zeno was assuming* that motion exists and tried to derive a contradiction from this assumption, whereas his interlocutor asserted that Zeno's attempt fails. There is, of course, no question-begging involved in arguing against an attempted reductio by making the very assumption that the proponent of the reductio made for the sake of trying to disprove it and showing that it does not lead to a contradiction. Hence, Dietrich's charge of question-begging fails.

More interesting is the claim that logical reasoning supposedly showed that Achilles can not get to point B (the resulting contradiction presumably being with the plausible assumption that if Achilles moves at all, he can also reach B). Assuming Achilles does move (see previous paragraph), let  $I_n$  be the distance corresponding to the  $n^{\text{th}}$  term in the Z summation. Dietrich's argument (\*) preyed on an ambiguity in the word 'always', which can be read in two ways: as either (a) 'forever' or 'eternally' (or similar), or (b) 'at each moment of reaching the end of an  $I_n$ ' (or similar). Reading (a) is tempting, and it would indeed imply Zeno's desired conclusion, but it does not follow from the assumptions, whereas the second reading (b) does follow from the assumptions, but it does not lead to a reductio ('as long as you have not reached B you still have some way to go' entails no contradiction, unless you already start off by assuming that motion is impossible, which begs the question against those who believe in the reality of motion). Thus, the attempt to derive a conflict with logic from the assumption of motion fails.

Where does science come in? Mathematics shows us that an infinite 'sum' of positive quantities need not be infinite, so reading (b) does not imply (a). Pace Dietrich, the real inferential leap is not made by the Fans of Math, but by him in passing from 'an infinite number of intervals have to be traversed' to 'this can not be done'.

Psychology might help us understand why it is tempting to mistake this inferential leap for a logical conclusion: It is easy to forget that the  $I_n$  are getting shorter *very* fast. Tellingly, while Dietrich said, 'Achilles has to cover an infinite number of *decreasing* halfway distances' (p. 481, emphasis added), he dropped this crucial 'decreasing' in his formalization of the argument on p. 483. Once one forgets that the intervals get shorter, it may easily appear as if the task can not be completed; as an ancient Chinese philosophical text put it, 'a one-foot stick, every day take away half of it, in a myriad ages it will not be exhausted' [12]. This, in turn, may conceivably be rooted in comprehension through perceptual simulation (compare [9] p. 320f): writing (or pronouncing) each term in  $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \dots$  takes roughly the same time; thus, the time to cover the infinite collection of intervals  $I_n$  may counter-factually appear infinite as well.

Science is relevant to an additional problem with Dietrich's argument: The assumption that motion exists does not imply that movement (e.g., Achilles' run) can be subdivided into arbitrarily small parts (e.g., the parts of the run which crosses only one  $I_n$  for extremely large  $n$ ). This may be implied by physiology and movement science: movement happens through muscle contraction, which in turn is caused by efferent nerve impulses, which lead to the release of molecules (neurotransmitters) at the motor end plate, which finally leads to muscle fibers contracting. Since molecules come in discrete rather than continuous

quantities, it may well be that muscle contraction also happens in discreet quantities, hence also movement<sup>3</sup>. Even more basically, it is not clear that time and space can be chopped up in arbitrarily short intervals: what happens below Planck length and time is anybody's guess. All these are contingent matters, and these views may be wrong, of course, but that is exactly the point: there is no certainty in Zeno's argument (despite what many seem to believe); it is not a case of logic trumping empirical science.

### 3. Skepticism': Beliefs and Psychology

#### 3.1. *The (Alleged) Problem and Its (Alleged) Solution*

Turri [9] took skepticism to be the view that we know nothing or next to nothing (p. 307). According to him, 'we<sup>4</sup> find these assertions incredible and are prone to reject them out of hand as ridiculous', which he considers to be the wise response of sane people. Nevertheless, he found that there remains a certain residual dissatisfaction so that thoughtful people will find this somewhat troublesome, even suffering more than a modicum of intellectual anxiety. (p. 308) This leads him to the psychological question of why 'we, individually and collectively, over thousands of years, keep revisiting skepticism?'

In order to answer this psychological question, Turri presented what he called the classical argument for skepticism: Let O denote an ordinary claim, and T some tricky claim, the *denial* of which ( $\sim T$ ) obviously follows from O (p. 309, original emphasis). The argument, then, is as follows:

1. If we know that O, then we know that  $\sim T$ .
2. But we do not know that  $\sim T$ .
3. So we do not know that O.

According to Turri, the answer to the psychological question then consists of noting first that it involves a belief that rests on inference rather than observation (the conclusion in 1., i.e.,  $\sim T$ ) and that has a negative content (that something is *not* the case); second, the assertion that humans are biased against ascribing knowledge to such negative inferential beliefs (hence are *biased towards* 2., i.e., *not* knowing that  $\sim T$ ). Turri then attempts to provide evidence for such a bias by performing two psychological experiments, which were based on specific skeptical scenarios from the philosophical literature.

Experiment one involved two different story-lines, each with four versions: (inference or perception)  $\times$  (negative or positive). In story-line 1, an office worker had parked his car in the parking garage; then, his assistant asked him, 'Is your car parked in space C8? It's not unheard of for cars to be stolen'. The office worker is then described either as thinking for a moment (inference) or as looking out the window (perception) and then responding, 'No, my car hasn't been stolen' (negative) or 'Yes, my car is in C8' (positive). Participants in the experiment were then asked whether the office worker knew, or only believed, that the car was parked in C8 (positive version) or had not been stolen (negative version). Story-line 2 was about a person who has visited the city zoo every day for the past ten years, with their favorite exhibit being The Big Cat Exhibit. Over thousands of observations, the animal in this exhibit has always been a jaguar. In the inference version, the person was one day unable to go to the zoo (in the observation condition, she goes there and looks at the animal) and thinks, 'the animal in the Big Cat Exhibit today is' a jaguar (positive version) or not a leopard (negative), and it indeed is a jaguar (positive) or not a leopard (negative). Again, participants had to ascribe knowledge or mere belief to the person. Experiment two had three conditions, two of which were very similar to story-line 2 in experiment one, the third version being that the animal had never been a jaguar. From the results of these experiments, Turri [9] (p. 320) concluded that inferential belief with a negative conclusion is judged especially harshly and is unlikely to be classified as knowledge, and claimed that classic skeptical arguments owe a good deal of their potency to this evaluative bias against negative inferential beliefs.

#### 3.2. *Philosophy Untouched?*

Dietrich [8] (p. 492f) recast Turri's argument as follows:

1. People evaluate inferential beliefs more harshly than perceptual beliefs.
2. People evaluate an inferential belief more harshly when its content is negative.
3. If (1) and (2), then the source–content bias exists.
4. Therefore, the source–content bias exists.
5. The second premise of the skeptical argument is a harsh evaluation of a negative inferential belief.
6. If the source–content bias exists and the second premise of the skeptical argument is a harsh evaluation of a negative inferential belief, then the appeal and force of the skeptical argument are a byproduct of our psychology.
7. Hence, the appeal and force of the skeptical argument is merely a byproduct of our psychology.
8. If the appeal and force of the skeptical argument are a byproduct of our psychology, then skepticism only results from our psychology.
9. Therefore, skepticism only results from our psychology.
10. Therefore, skepticism ('the view that we know nothing': p. 490) is not tenable.

Against this argument, Dietrich raised three objections:

First, experiments supposedly rest on knowledge claims (scientific ones, in particular) that the skeptic rejects and therefore beg the question against the skeptic 'and egregiously so' (p. 493). They also supposedly presuppose the view that there is a mind-independent external world. On behalf of Turri, Dietrich then argued that when raising doubts about scientific methodology, the skeptic takes on the burden of proof, and Dietrich concedes that this rebuttal is powerful but nevertheless claimed that there are two motivations to resist it: ambition (according to Dietrich, Turri tried to 'explain away skepticism *for the skeptic*' [original emphasis] rather than only for the anti-skeptic), and the possibility of *epoché* (neither asserting nor denying a position in the skeptical argument, 'like Sextus Empiricus').

The second objection rested on distinguishing quotidian negative inferential beliefs from world-changing negative inferential beliefs. According to Dietrich, Turri's experiments only dealt with the former, whereas 'Skepticism is most powerfully argued for by using world-changing negative inferences', since these are experientially indistinguishable from the world we think we inhabit (p. 496). Dietrich conceded that the force, appeal, and emotional power of such scenarios might come from human psychology but insisted that they also have logical plausibility [sic] as a correct description of the way things are which results from experiential invariance, and that 'for Turri to insist that this distinction isn't real, or isn't real in this case, is to beg the question against the arguments presented here'.

The third objection was that, according to Dietrich, Turri 'must grant the negative inferential belief contained in his argument and its conclusion', in effect making his argument self-defeating.

From this, Dietrich (p. 498) concluded that 'readers of Turri's paper (including Turri) cannot know that he has successfully refuted skepticism. At best, such readers should suspend their judgment—which is a kind of skepticism<sup>5</sup> about Turri's project'.

Did Dietrich succeed in showing that Turri's experiments leave philosophy untouched? No, as we will see shortly. Turri's experiments and conclusions do indeed suffer from a number of problems, but these are of a *scientific* rather than a philosophical nature. In order not to disrupt the discussion, these objections are discussed in the Appendix A.

We can see that Dietrich's arguments for the claim that science is irrelevant to the philosophical question fail for the following reasons:

The third objection said that Turri must grant at least some negative inferential beliefs. But then, what would stop him from doing so? Nothing, after all, he claimed to show that humans tend to judge negative inferential beliefs *too harshly*, so we should be *more* ready to grant them knowledge status than the immediate intuitive reaction would do; i.e., we should reject that 'we don't know that  $\sim T$ '. Contrary to what Dietrich seems to imply, Turri did not find the negative inferential beliefs themselves problematic, only the bias



against accepting such beliefs as knowledge, which he thought he had revealed. Hence, this objection fails<sup>6</sup>.

Objection two and the ‘ambition’ part of objection one suffer from a common problem: they overestimate Turri’s ambition in his paper. It seems quite clear that he did not take skepticism (as he defined it) seriously: it supposedly does not survive contact with daily life, it is incredible, ridiculous, inconsistent with common sense, sane people do not have such doubts, . . . (Turri, p. 308). Turri was explicit in that he tried to answer a *psychological* question for himself, to rid himself of residual dissatisfaction and intellectual anxiety. There seemed to be no hint of an ‘ambitious anti-skeptical project’, pace Dietrich (p. 495), and no need to argue against the alleged distinction between psychological and logical plausibility—a distinction that an I-know-nothing-skeptic could not assert in the first place.

Most peculiar in Dietrich’s paper is his invocation of Sextus Empiricus, as if Sextus had subscribed to the definition of skepticism used by him (and by Turri), i.e., the view that nothing can be known. In contrast, Sextus explicitly said that he only refrains from assenting to ‘the non-evident matters investigated by the sciences’ (*PH I.7*), and ‘this, too, must be kept in mind: it is dogmatic statements about the non-evident that we say we neither affirm nor deny [13];<sup>7</sup> we grant the things that stir our *pathé* and drive us by force to assent’. (*PH I.20*) In line with this, at the very beginning of his *Outlines of Pyrrhonism (PH I.1)*, Sextus distances himself from those who assert that the truth can not be apprehended (the followers of Cleitomachus and Carneades, as well as other Academics)—in contrast to these would-be-skeptics, the Pyrrhonist *skeptikoi* continue to search for the truth. Having experienced dogmatic beliefs as inherently disquieting, the *skeptikos* have no reason to throw strange, far-fetched scenarii of the kind that Turri, Dietrich, and others invent at happy and unsuspecting dogmatists. Only when dogmatists try to convince the *skeptikos* of some supposedly absolute and indubitable truth—saying maybe something like, ‘surely you can not only assent to the impression of having hands and eyesight, you *must* admit that you *know* for certain you have for example hands, or eyesight’; then, the *skeptikos* might answer with something like, ‘well, there seem to be people having phantom limbs, suffering from Anton syndrome, or maybe both; so I see no reason to restrict my psychological flexibility by allowing myself being nailed to a rigid dogma. That much said, I do undogmatically assent to appearances like that I have hands and that I can see them’. Furthermore, in cases where a dogmatist is suffering from intellectual anxiety (maybe because of noting anomaly in “the facts” and being at a loss as to which of these “facts” deserve assent, expecting that only by settling this they would achieve *ataraxia* [undisturbedness, equanimity], see *PH I.6*), the *skeptikos* may offer *epoche* as a possible alternative, a kind of therapy for this anxiety. Indeed, the *skeptikos* may be on the right track with this, as considerable research in modern psychotherapy suggests ([11] also compare the last section in [14]).

In summary, Turri argued that certain kinds of skeptical arguments owe their potency to a good extent to a psychological bias against ascribing knowledge to negative inferential beliefs. Dietrich rests his claim that Turri’s argument is question-begging on three objections: (a) that Turri himself invokes negative inferential beliefs; (b) that Turri’s scenarii do not involve ‘world-changing negative inferences’, i.e., such that are experientially indistinguishable from the world we believe we inhabit; and (c) experiments rest on knowledge claims. As we saw above, neither of these objections hold up: Turri invoking negative inferential beliefs is entirely unproblematic for him; in distinguishing world-changing from other negative inferences, it is Dietrich who begs the question, and as regards knowledge claims more generally (including scientific ones [15–17]<sup>8</sup>) Dietrich is right in noting that the burden of proof is on the nothing-can-be-known skeptic but fails to shift this burden. What Dietrich shows at most is that Turri’s argument may not touch a philosophical question that it was not intended to touch in the first place.

### 3.3. The Relevance of Science

Dietrich’s philosophical objections to Turri’s paper [9] do not stand up to scrutiny. Nevertheless, Turri’s paper is problematic on scientific grounds (see the Appendix A to the

present paper). The crucial point to emphasize again is that these are *scientific* objections (which can be—and have to be—dealt with by scientific means) to scientific findings that are relevant to the philosophical questions. Pace Dietrich, Turri's science does touch philosophy—maybe incorrectly, but if so, then not for the purely philosophical reasons Dietrich forwards.

There is another way in which science seems relevant to the issue at hand: It may help dispel the widespread mistake among philosophers of confusing Descartes-style know-nothing skepticism with Pyrrhonism, as explained by Sextus Empiricus. This confusion goes back at least to David Hume, and Dietrich also seems to suffer from it. One science that is relevant here is philology, which informs us that the Greek word *doxa* does not mean belief [18], hence when Sextus says the Pyrrhonist is *adoxastos*, he does *not* mean he knows nothing at all. Once we take this into account, psychology tells us that Sextus' Pyrrhonism makes a lot more sense in its quest for *ataraxia* [11].

#### 4. Notes on Artificial Intelligence and on Echolocation

Up to here, it has been argued in relation to Zeno's *Dichotomy* paradox that, quite simply, the scientists are right, and philosophers like Dietrich [8] are wrong in their reasoning, and furthermore that psychological science may explain why these philosophers err in their inferences. Regarding Turri's paper [9], it has been argued that the reasons his paper falls short of its goals are scientific rather than philosophical. Therefore, both cases seem to contribute to general doubt about the relevance of philosophy relative to science rather than providing examples of philosophy being untouched by science.

On the other hand, both examples could by some be considered ephemeral: Few people seem to take self-contradictory assertions like 'I know that nothing can be known' seriously, nor is the relevance of claims that motion does not 'really' exist obvious (if an arrow hits your body, the belief that arrow's motion was only apparent rather than real is likely to be of little consolidation). Yet, there may be issues of high importance to humans where science may not be able to offer answers, including existential issues around life, death, disease, experience, meaning, etc. This section briefly looks at two topics that may belong to this category: the frame problem in artificial intelligence and the qualia involved in echolocation.

##### 4.1. A Note on the Frame Problem

We can't do AI without solving the Frame Problem. But *we don't know how* to solve the Frame Problem. That in a nutshell, is why, though science works, AI doesn't.

(Jerry Fodor in 1987, approvingly quoted by Dietrich).

According to Dietrich [8] (p. 486), the frame problem arises because when there is change, one has to update one's relevant beliefs, but to know which beliefs are relevant, one has to canvass all of one's beliefs—which appears to be highly impractical. This supposedly is a serious and deep philosophical problem and, *therefore*, probably completely intractable. Dietrich (p. 487) here again referred to Fodor, who 'thought the Frame Problem was so serious that it explained why AI had failed thus far and was going to continue to fail. [...] AI researchers and their philosophical allies disagreed with Fodor'. The latter think that it is a difficult technical problem in the logic of reasoning about change (p. 489). To this, Dietrich says (p. 490), philosophers answer that deploying the logical machinery involved is entirely question-begging because the machinery derives from asserting the very claim the philosophers deny.

I have to admit that I am not completely sure what Dietrich's argument is supposed to be; unlike his other two cases, he does not present his argument concerning the frame problem in a step-by-step form. My best guess is the following: In Section 3.5, he refers to Fields [19] for the claims that the frame problem and the problem of object re-identification are equivalent and that object re-identification, in turn, is analogical in nature. Then Dietrich says that analogy-making in the mind changes the mental representations that one uses to

think about objects and changes, leading to an infinite regress. From this, he then concludes the following: ‘It is clear that the mind itself begs the question when it comes to the Frame Problem: It simply assumes that certain representations reidentify objects’. Apparently, the question-begging mind somehow implies that science, but not Dietrich’s philosophy, is question-begging. However that may be, Dietrich relies on Fields, and Fields’ argument is based to a considerable part on neuroscience, as Dietrich [8] (p. 489) himself notices. So, again, philosophy appears *not* to be untouched by science [20]<sup>9</sup>.

#### 4.2. A Note on Nagel’s Bat

One particular area that some philosophers have tried to mark as their exclusive home turf is the study of consciousness, ‘often taken to be beyond the reach of objective scientific methods’ (Allen and Trestman [21] referring to Nagel [22]). I do feel sympathies for such lines of thought, but again, it may be advisable to be wary of jumping the gun: There is at least one<sup>10</sup> fly in the philosophical ointment. Actually, much more than just a fly: a whole bat.

The highly influential paper ‘What Is It Like to Be a Bat?’ by Thomas Nagel [22] has by now<sup>11</sup> been cited 13,805 times according to Google Scholar, with about a third of these citations having happened over the last five years. Its central premise is that ‘bat sonar [echolocation: orientation by reflected sound], though clearly a form of perception, is not similar in its operation to any sense that we possess, and there is no reason to suppose that it is subjectively like anything we can experience or imagine’, which according to Nagel ‘brings out clearly the divergence between [...] subjective and objective’ (p. 438), and thus the difficulty of treating subjective experience using the methods of objective science. The problem with this is that human echolocation *does* exist; in fact, there is quite a number of scientific publications on the human ability to echolocate (for example, [23–25]) [26–28]<sup>12</sup>. So if your gut feeling tells you that bats are necessarily ‘a fundamentally *alien* form of life’ (p. 438, original emphasis) just because they can orient themselves through the reflections of sounds they omit, it might be advisable to distrust this reflex—just as it seems advisable to distrust the reflex that Achilles can not cover an infinite number of (rapidly decreasing) intervals, or the reflex that doubting negative inferential beliefs more than other beliefs must constitute a bias.

## 5. Discussion and Conclusions

### 5.1. Philosophy and Science

The present paper started off with references both to Hawking’s dictum that philosophy is dead and to Quine’s view that philosophy is continuous with science [4,29]<sup>13</sup>. From the context of his statement, it is clear that Hawking did not claim that all philosophy is dead, not even all academic philosophy; he refers to those parts of philosophy that think they can study cosmological questions without being sufficiently up to date in the relevant sciences<sup>14</sup>. I do not know how many of these exist, but at least two observations suggest to me that philosophers operating with insufficient scientific knowledge are not uncommon: First, only a few years ago, Dennett [30] (preface) noted that hundreds of young philosophers have a solid interdisciplinary training cognitive science, neuroscience, and computer science—which seems to be a remarkably small share of philosophers studying the mind. Second, a considerable proportion of philosophers opining on whether Pyrrhonism is psychologically possible don’t seem to have bothered looking at what psychology tells us about what is psychologically possible.

The examples discussed above lend support to Quine’s view by showing the relevance of science for certain philosophical questions in examples where it has been strongly denied (Dietrich on Zeno and on skepticism) or overlooked (Dietrich on Sextus and on the frame problem, Nagel’s bat) [31]<sup>15</sup>.

### 5.2. Philosophy and Wisdom

A popular view often claimed to go back to Plato and Aristotle, is that philosophy aims at truth and knowledge<sup>16</sup>. The above examples, though of course not providing



definite proof, strongly indicate that science rather than philosophy (*if* understood to be importantly different from science) is the proper way to approach these goals. In fact, this is already implied in the terms used: *scientia* deals with knowledge, whereas *philosophia* would be concerned with wisdom. In line with this, there has been a recent resurgence in the interest in philosophy as a way of life [32,33] or art of living (*ars vivendi* or *Lebenskunst*), emanating from Pierre Hadot's emphasis on the practical aims of ancient Greek philosophy (e.g., Hadot [34]; see Faustino [35] for a discussion of Cooper's well-known objections). Is this an area where philosophy can proceed untouched by science or at least make a significant contribution?

Regarding the second part of this question, history suggests a positive answer: Ancient philosophy (both Greek and Asian) was crucial in the development of cognitive psychotherapy [36] and mindfulness-based forms of psychotherapy [37–39], modern<sup>17</sup> philosophy enabled existential and phenomenological oriented forms of therapy [40–42]. But again, this does not imply that philosophy can proceed in blissful ignorance of science. As mentioned above, modern research arguably seems to vindicate a number of Pyrrhonian ideas about *ars vivendi*; if so, this is of obvious relevance to philosophy (for example, with regard to the well-known philosophical *apraxia* objection to Pyrrhonism: [11]). Even more to the point, science–remote metaphysical speculations in which philosophy oversteps its proper bounds (Machery [43]) are unlikely to be helpful in living a flourishing life [7]<sup>18</sup>.

### 5.3. Conclusions

If you suspect your car may have been stolen, common sense rightly advises you to go and check rather than just think about where you parked it. When dealing with matters remote from an everyday experience like infinity, or the relationship of brain and mind, including many so-called philosophical problems (e.g., infinity in Zeno's paradox), both common sense and philosophical "intuition" need refinement—which Quine rightly identified with science (understood in a wide sense). The examples discussed in the present paper, though not constituting definite proof, do suggest a simple (and for some probably uncomfortable) conclusion: to the extent that some parts of philosophy refuse to be touched by science—that much worse for philosophy.

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### Abbreviations

*PH*: Sextus Empiricus. *Pyrrhoniae Hypotyposes* [Outlines of Pyrrhonism]. Translated by Benson Mates [44].

### Appendix A

Concerning the empirical part of Turri's [9], there seem to be reasonable doubts concerning the experimental setup, the statistical evaluation, as well as the conclusion drawn:

First, the statistical part: Turri's paper relied heavily on *p*-values, i.e., NHST (Null Hypothesis Significance Tests). These have been known to be problematic for a long time [45], and this recognition is increasing. In fact, in 2016, the American Statistical Association advised that 'Scientific conclusions [. . .] should not be based only on whether a *p*-value passes a specific threshold' [46]. Even putting general misgivings about NHST

to the side, there are problems with the statistical aspect of [9], as Turri asserted to have shown, for example, that knowledge denial did not differ between Positive Perception and Negative Perception conditions (p. 315), but the applied test seems to have power of less than about 0.32<sup>19</sup>—far from anything that would allow to infer nonexistence of a difference.

Maybe, more importantly, there are serious problems with the experimental setup. Take story-line 1 in experiment one: The assistant says to the office worker, ‘is your car parked in space C8? It’s not unheard of for cars to be stolen’. In the so-called inference condition, the office worker ‘thinks for a moment’ before answering. Where is the inference? Presumably, the office worker just tried to remember whether it was really in C8 that he parked his car so that this version of the vignette measured knowledge attribution to memory rather than inference. Even worse, the participants were primed for the possibility that the car may have been stolen, in which case it obviously made more sense for the office worker to check whether it was still there rather than simply think about where he parked it. Nor is ‘not stolen’ equivalent to ‘it is there’: the car could have been stolen for a quick fun ride and brought back, or it might be gone for reasons other than being stolen (maybe it was towed, for example). Regarding the inference positive version (thinks for a moment . . . car is in C8), participants might have misunderstood ‘car is in C8’ as ‘I parked it in C8’, since otherwise the question might seem silly (for the same reason as above: mere thinking won’t help if possible theft is the issue). Story-line 2 (and the related experiment two) also has a number of serious problems. To sketch just a few, the story is extremely implausible (e.g., visiting the city zoo *every day for the past ten years*, each time there being *only one animal* in the Big Cat Exhibit), participants must be aware that jaguars and leopards look similar (I was not aware of this before reading these papers), apparently no label at the Big Cat Exhibit (in contrast to the skeptical scenario that was supposedly captured in this experiment, there the animal was ‘in the exhibit labeled “Jaguar”’: (p. 310)), the inference is not a deduction but only an induction (in a highly implausible setup, as already noted), etc.

The most important objection to Turri’s argument in [9] is nevertheless this: Even if he succeeded in demonstrating a *pattern* of less frequent knowledge ascriptions in the case of negative inferential beliefs, this does by no means show that this pattern constitutes a *bias*. To conclude that it is a bias, one would have to show that such negative inferential beliefs are as trustworthy as, say, positive observations. This seems unlikely to be the case in the vignettes used by Turri. Take, for example, story-line 1: If it is a life possibility that your car has been stolen, then checking whether it is still there is surely a more reliable way of belief formation than just remembering where you parked it.

## Notes

- <sup>1</sup> Importantly, for Quine, philosophy is continuous with science [2] (p. 232). For example, ‘Descartes’ dualism between mind and body is called metaphysics, but it could as well be reckoned as science, however false’ (Quine, [3], p. 252). It is also important to keep in mind that Quine uses “science” in a wide sense, *not* restricted to the natural sciences.
- <sup>2</sup> To understand the scare quotes, see, for example, below or Eichorn [10].
- <sup>3</sup> Please note: I am not knowledgeable enough to know whether this reasoning really holds up, but it, at the very least, does make yet another case for the relevance of science to the philosophical question. A reviewer pointed out that Zeno had another argument for the discrete case. This may or may not help improve Zeno’s overall argument, but that still would mean that science is relevant in showing that the philosophical argument has to be amended (whether the result is a sound argument or not), which is what I am arguing for.
- <sup>4</sup> Turri does not explain to whom this ‘we’ refers.
- <sup>5</sup> It is not, at least in the sense relevant to Dietrich’s argument, see further down in the main text.
- <sup>6</sup> The confusion seems to arise from Turri talking about the negative inferential belief ‘ $\sim T$ ’ (which is derived from O), whereas Dietrich focuses on the negative inferential belief ‘ $\sim(I \text{ can be certain that } \sim T)$ ’ (which is derived from experiential invariance). Assuming one finds these two inferences equipollent, one finds oneself in a state of *epoche*, which—pace Dietrich, see main text—is not a form of ‘skepticism’ as understood by Turri and Dietrich.
- <sup>7</sup> Sextus does say that the *skeptikos* is *adoxastos* (without *doxa*), but *doxa* here means ‘a definite position about how things are, a position that is not adequately supported’ [13].
- <sup>8</sup> For discussions of the relationship between Pyrrhonism and science see [15,16] (originally published as [17]).

- 9 I want to emphasize that I am less certain in this case than I am in the previous two since the frame problem is further away from my core competencies. On the other hand, today's successes of artificial intelligence should give us pause for thought about claims like 'AI had failed thus far and was going to continue to fail'. Also, in Dietrich's argument, there is a not exactly undisputed assumption that reasoning rests on mental representations (compare [20] (p. 172, footnote 22)). Finally, one would expect a remark on how his argument in this section, which relies crucially on change, squares with Dietrich's apparent approval of the Parmenidian view that change is an illusion (the 'perversity of the Way of Opinion' according to Dietrich, p. 484); and similarly with Sextus' *epoche* regarding the existence of motion (PH III.81).
- 10 I believe there are many, but this has to be left for another occasion.
- 11 June 2024.
- 12 Philosophers seem to blissfully ignore this fact (searching the Stanford Encyclopedia of Philosophy for "What it is like to be a bat" results in 25 entries, searching for "human echolocation" in none at all). The few exceptions include [26–28].
- 13 Quine also observed (and I wholeheartedly agree) that science is refined common sense rather than a substitute for it: 'science is not a substitute for common sense, but an extension of it. The quest for knowledge is properly an effort to broaden and deepen the knowledge which the man in the street already enjoys, in moderation, in relation to the commonplace things around him' [29] (p. 229). This also applies to philosophy: 'He holds that all of our attempts at knowledge are subject to those standards of evidence and justification which are most explicitly displayed, and most successfully implemented, in the natural sciences. This applies to philosophy as well as to other branches of knowledge' [4].
- 14 This also shows that there is no incompatibility between the views of Hawking and Quine. If *all* philosophy was dead, and science is continuous with philosophy, then one may have asked whether this does not imply that science is dead, too—a conclusion that Hawking certainly would not have endorsed.
- 15 I will not discuss the reverse way of arguing for a separation of science and philosophy, namely claiming that science can proceed entirely separate from philosophy. See, for example, De Haro [31].
- 16 Even though when Plato had Socrates argue for the importance of philosophy in the *Theaetetus*, he did not present knowledge as a goal in itself but as a means to achieve divine *eudaimonia* [175e–176e], similarly Aristotle in book X of the *Nicomachean Ethics*.
- 17 Possibly inspired by ancient philosophy, depending on whether Husserl developed his method of *epoche* independently or not.
- 18 See my paper [7] for the discussion of an example involving the illicit application of so-called intuitions about Nagel's bat and McTaggart's oyster to positive psychology.
- 19 While the paper did not report power, the reported data do allow an approximate calculation:  $N = 604$  over eight conditions (p. 312) means about  $N = 76$  per condition and response rates of about 0.17 and 0.26 (Figure 1 on p. 315) together with the standard threshold of  $p = 0.05$  imply power of 0.316 (one-sided) or 0.212 (two-sided), using the online calculator [http://hedwig.mgh.harvard.edu/sample\\_size/fisher/js/fisher.html](http://hedwig.mgh.harvard.edu/sample_size/fisher/js/fisher.html) accessed on 9 October 2020.

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