# META-STANCE CHOICE IN THE SCIENTIFIC REALISM DEBATE: IN DEFENCE OF TRUTH

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## 1. Introduction

This paper contributes to the discussion of meta-stance choice in the scientific realism debate. The main aim is to introduce and explicate a novel meta-stance that is based on veritist teleological epistemology—currently a dominant meta-epistemological view. It proposes that our methods of justification and epistemic belief obligations aim at believing truths and avoiding error. Importantly, these two values are in tension. I identify two main competitors to this view, though I will argue that, with some explication, they can be integrated into the framework I present. One sees realism and anti-realism as being downstream from incommensurable stances, such as an empirical and a metaphysical stance. The other sees stances as negotiating between explanatory power and error avoidance. A secondary aim is to clarify the three meta-stances, as they are frequently not explicitly distinguished. Finally, I defend the meta-stance I present against the two competitor views. I will argue that it

(i) has enhanced *generality*, as the values of the competitor views (explanatory power and empirical gain respectively) can be explicated as specific instances of the more general values I propose,

(ii) offers a *comprehensive explanation* of the anti-realist sentiment, and

(iii) has the potential to *mitigate* the recurring stalemate within the debate.

Furthermore, on certain explications of the two competing meta-stances, the presented meta-stance also demonstrates greater *impartiality*. It does not inherently favor either the realist or anti-realist position from the outset and instead provides a neutral starting point for the debate. In contrast, I will argue that meta-stances that view the sole positive epistemic value as either empirical gain or explanatory power lack such impartiality. However, I will present a voluntarist interpretation of the competing meta-stances that can address this critique.

Let me start with a few remarks on 'scientific realism'. One can distinguish between scientific realism's metaphysical, semantic, and epis-

temological dimension (cf. Psillos 1999; cf. Chakravartty 2017). This paper focuses on the epistemological dimension. I understand an epistemological scientific realist as being committed to believing that *unobservable*[1] entities and/or structures, as put forward by a proper subset of our scientific theories, exist. Scientific realism is the position that

(i)  those beliefs have some kind of rational standing (e.g., justification, warrant, reasonableness)[2] based on scientific investigation and

(ii)  that rational standing is strong enough to epistemically obligate one to believe in said entities and/or structures.[3]

This explication of scientific realism in terms of some form of justification is common[4] but it is even more common to explicate the rational standing in terms of *knowledge* (e.g., Boyd 1983; Chakravartty 2017; Hacking 1983; Ladyman 1998). Still, 'knowledge' typically implies justified belief'.. However, I think that this explication is quite problematic because it packs the goal (true believing) and the methods (justified believing) into one complex concept .[5] Still, for the purpose of this article, I will not quarrel with 'knowledge' either. However, I want to avoid understanding the epistemological dimension merely axiologically—in terms of what the aim of science is (cf. van Fraassen 1980), unless this implies, in addition, norms of belief or knowledge.

Condition (ii) is meant to exclude from the realist camp any constructive empiricists who believe in unobservables, but also believe that there is no rational obligation for that belief. One objection to con-

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1. I will not question here the common distinction between observables and unobservables, but nothing in my argument depends on the choice of the empirical basis for the anti-realist.
2. I will use 'justification' for now, but you can choose your preferred notion of rational standing here.
3. For obvious reasons, I do not want to add the necessary condition for being a realist that one's beliefs are actually true. Justification, while implying some guide to truth, does not guarantee truth.
4. E.g., "it is reasonable to accept [...]" (Musgrave 1988), "it is reasonable to believe [...]" (Musgrave 2007). "Why We are Justified to Believe in Colored Quarks" (Massimi 2004).
5. For a different criticism see Rowbottom 2019: 463-465

dition (ii) might be that it also excludes some voluntarist realists, such as Chakravartty, so maybe (ii) is too strong.[6] I will discuss the case of voluntarism below. This explication of scientific realism should make my target sufficiently clear.

Today, many philosophers of science think that the realism debate is at a "stalemate" (Forbes 2017a, Chakravartty 2017: 205), "goes around in circles" (Vickers 2023: ix), "goes around in circles without reaching a consensus" (Brousalis & Psillos 2023; Vickers 2023: ix), or has even reached a "dead end" (cf. Blackburn 2002, Magnus and Callender 2004, Monton 2007: 3). This sentiment is not new (cf. Fine 1986a: 3, 1986b: 136-150, Nagel 1961: 145, Wylie 1986: 287). Why does this sentiment arise? I argue that, ultimately, choosing an account in the realism debate cannot be decided solely by discussing evidence, whether it is drawn from the sciences themselves or from the history of science. At some point, the discussion always hits a brick wall and one needs to discuss epistemic values. This present paper focuses on this dimension.

## 2.  The Meta-Stance based on Teleological Epistemology

### 2.1  *Precursor 1—Epistemic Risk*
In this section, I introduce a meta-stance grounded in teleological epistemology. This perspective draws upon two concepts previously discussed within the scientific realism debate: 'epistemic risk' and 'the Jamesian truth-goal'. I will start with 'epistemic risk' in this subsection before implementing both concepts within a more general theoretical framework of teleological epistemology.

A crucial starting point for discussions of the value dimension of the realism debate is Alison Wylie (1986). She explicates the disagreement in the debate using the notion of *epistemic risk*—the risk of being in error. Wylie (1986: 290) argues that anti-realism is rooted in a meta-philosophical choice to minimize epistemic risk due to the potential for global error, while realism tends to be more tolerant of risk.

Whenever the concept of risk is invoked, the question of what is

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6. For a weaker conceptualization see Chakravartty & van Fraassen (2018).

being risked inevitably arises, indicating that there is a trade-off involved. Wylie's account is somewhat unclear about the benefits for the risk-seeker. For this, we can turn to Chris Swoyer's thesis of a "fundamental ontological trade-off":

> This is the trade-off between explanatory power, on the one hand, and epistemic credibility, on the other; between a rich, lavish ontology that promises a great deal of explanatory punch, and a more modest ontology that promises more epistemological security and believability. (Swoyer 2008: 29)

My interpretation is that Wylie may have had a similar perspective. Clarifying her view with reference to Swoyer's thesis yields the following depiction: Realists opt for greater epistemic risk, potentially gaining explanatory power at the cost of sacrificing epistemic security. Anti-realists, on the other hand, opt for less epistemic risk and gain epistemic security while sacrificing explanatory power. I think this is the most common way, especially on the realist side, to embed the scientific realism debate in an epistemological trade-off. We find it, for instance, not only in Wylie (1986), but also in Park ("Believe less. Explain less") (Park 2017: 113), Forbes (2017b), and predated to some degree in van Fraassen (1989, 2002) and Chakravartty (2007, 2013).

To give one concrete example, let us analyze within a causal mechanistic model (Salmon 1984) the famous supernova explosion of SN 1987A, which was observable to the naked eye. Astrophysicists explain the observable phenomenon of SN 1987A by describing the mechanism through which the star's fusion failed to prevent the core from collapsing under its own gravity. This mechanism resulted in a significant mass loss, which is accounted for by introducing subatomic particles known as 'neutrinos'. These particles were detected hours before the light from SN 1987A reached Earth (cf. Illari/Williamson 2012: 124). Realists would explain the observable phenomena by referring to these unobservable mechanisms and entities. Anti-realists would typically confine their explanation to the domain of pragmatics (cf. e.g., van Fraassen 1980: 12) without referring to anything more fundamental to explain the phenomena.

## 2.2 *Precursor 2—The Jamesian Truth-Goal*

In his recent work, Chakravartty (2018: 232) describes the realism debate with reference to the Jamesian (1896 [2013]) truth-goal, which consists of two sub-values: believing truths and avoiding error. An important aspect of this characterization is that these two sub-values are in tension with each other. As we prioritize the goal of avoiding false beliefs over the goal of believing truths, our epistemic standards increase, and we become more likely to withhold belief. Conversely, prioritizing the goal of believing truths leads to lower epistemic standards and a decreased likelihood of withholding belief. This can be called *the fundamental epistemic trade-off*. I will call the choice of how to perform this trade-off *balancing*.

The Jamesian framework provides a more precise understanding of the term 'epistemic risk'. It involves balancing the two sub-values of the truth-goal. By placing more weight on avoiding error, one decreases epistemic risk, while placing more weight on believing truths means taking on more epistemic risk. With regards to *balancing*, Chakravartty calls for permissivism (Chakravartty 2018: 233) and concludes that one should "subtract the usual judgment that at most one party to these disputes is, in fact, correct" (Chakravartty 2018: 232). Thus Chakravartty ends up with a very permissive attitude[7], which resembles some part of van Fraassen's voluntarism. I largely agree with Chakravartty's permissivism (and stance voluntarism), but in this paper I want to focus on one concern I have with his presentation. After introducing James's framework, Chakravartty (2018: 232) does not specify the relationship between believing truths and explanatory power as the aim of inquiry. . Here, I want to specify that truth is a more fundamental goal than explanatory power and that framing the fundamental trade-off in terms of explanatory power is flawed. To explore this, it is

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7. This attitude was already present in Chakravartty (2007: 187; 2013: 31), but now it appears to be even more liberal.

necessary to briefly examine the broader epistemological framework in which the truth-goal is situated.

### 2.3 *Teleological Epistemology*

In current epistemology, the truth-goal represents only the axiological component of a broader framework called *teleological epistemology* or *epistemic instrumentalism*.[8] It can be divided into two elements:

1. *The Axiological Side: The epistemic good (the goal) is identified.*

The first element is the epistemic good. In our case, this concerns the Jamesian truth-goal. Such a view is frequently referred to as veritist teleological epistemology (henceforth *VTE*).

2. *The Deontic Side: The right is generally explained via the good.*

The second element is to define epistemic justification. We believe generally in the right (i.e., justified) way if doing so promotes the epistemic good (the goal) and we believe generally in the wrong way if doing so impedes the epistemic good. As Ronzoni (2010: 455) puts it: "[T]he good tells us what our general direction and our ultimate target should be, whereas the right tells us what are the legitimate options to get there".[9] Consider, for instance, evidentialism. Expressed within *VTE*, this account suggests that the optimal method of forming beliefs

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8. My broad use of the term 'teleological epistemology' is similar to Littlejohn (2018), Wedgwood (2018), and others. Furthermore, many will recognize my explication of teleological epistemology as epistemic consequentialism, a term I think would be better reserved for a narrower version of teleological epistemology.

9. This very broad characterization is all I want to refer to when speaking about teleological epistemology. I consider it uncontroversial, since it is accepted by most epistemologists from all kinds of orientations. For instance, Berker (2013: 355, footnote) lists 63 papers from 35 epistemologists who adhere to teleological epistemology, though my conception of teleological epistemology is even wider than his. To reject teleological epistemology, as I conceive it, one has to adhere to purely coherentist, subjectivist accounts of justification. For more details, see Kvanvig (2013: 361). This is something most epistemologists will not find feasible, and this paper is not concerned with such interpretations of science.

is to base them on evidence, as this is most effective in achieving our ultimate aim of believing truths and avoiding error. It is important to recognize that this makes justification merely instrumental to the epistemic good. We want justified beliefs because they are indicative of true beliefs. We develop our methods of justification as a mere instrument to achieve our epistemic goals. Obligations to believe arise if we aim at an epistemic goal, i.e., in our case, *truth*. As such, justification and obligations share a tight connection. We can only achieve our goal if we *actually* believe in the right way. If a belief that *p* promotes epistemic value, then we can only achieve our goal by *actually* believing that *p*. Thus, we are epistemically obligated to believe. For this reason, I explicated scientific realism in *section 1* with an obligation condition, but note that obligations arise only relative to the goal.

How does this bear on the epistemological debate concerning scientific realism? Let me begin with a point of agreement among numerous key advocates across the entire spectrum of the realism debate. Namely, realists typically accept that our current best scientific theories sometimes make false claims about unobservables, while anti-realist typically accept that some claims about unobservables might be true.

Let me substantiate this claim for the anti-realist side, as it is probably the more contentious. Laudan, for instance, does not claim that current science always errs about unobservables.. He is concerned with *knowing* the truth, not with possessing it (cf. Laudan 1978: 17). Note that one can possess the truth without knowing the truth and without being justified. Similarly, van Fraassen (1980) never denies that believing truths about unobservables is achievable. He simply claims that the aim of science is empirical adequacy. As Rowbottom (2010: 212) states: "van Fraassen does not deny the mere possibility that science might arrive at the truth, the whole truth, and nothing but the truth." In fact, it would be a considerable challenge for anti-realists to substantiate the claim that science has never been or will never be successful in accessing the truth about unobservables. Instead, anti-realists typically take one of two approaches: they either make a quantitative claim that successful theories are frequently erroneous, as Laudan does, or they

sidestep the issue of error frequency altogether and simply restrict the aims of science to the observable realm, as van Fraassen does. In general, there is a discernible shift among anti-realists, best exemplified by Stanford (2006), which suggests that the challenge lies in justifying our beliefs and acknowledging that epistemic security exists on a spectrum. This security diminishes as we are "pushed farther and farther from the evidential resources of immediate observation and experience" (Stanford 2006: 35). This argumentative strategy is most evident among the so-called 'selective realists', who argue that certain portions of our scientific theories meet the justification threshold while others do not (see e.g., Worrall 1989; Psillos 1999; Chakravartty 2007).

Accordingly, let us proceed with the premise that our present leading scientific theories will sometimes make true and sometimes false claims about an unobservable reality. It is important to clarify that this commitment is minimal—I am not attempting to measure how often truth is achieved or how frequently errors occur. Given this, both realists and anti-realists are making a specific trade-off Realists believe more truths about unobservables than anti-realists, and anti-realists commit fewer errors than realists. Selective realists occupy an intermediate position. Worrall (1989), for instance, claims that structural realism offers the best of both worlds: structural realists do not believe in unobservable entities, which are more prone to errors (and thereby commit fewer errors than full-blown realists), but embrace less error-prone beliefs in unobservable structures (and thus believe more truths than anti-realists).

I have thus far shown how to understand the value dimension of scientific realism in terms of VTE—that is, as a trade-off between believing truths and avoiding errors. This perspective not only contextualizes the epistemological realism debate with its various competing accounts within a comprehensive epistemology, but also explains why we have arrived at a stalemate: If different agents adopt different epistemic values—which push risk-averse inquirers towards more anti-realist accounts and risk-tolerant inquirers towards more realist accounts—and if these agents remain committed to their values, then this provides a plausible explanation for the recurring stalemate in the debate.

There are currently two main competitor views that claim to achieve the same thing, i.e., address the realism debate from a meta-epistemological perspective and explain the stalemate. The first sees the debate as a trade-off between explanatory power and error avoidance (the Wylie-Swoyer trade-off). The second conceives the realism debate in terms of various incommensurable stances, such as an empirical and a metaphysical stance. I will now argue that both of these competitor views are either flawed or incomplete, starting with the former.

### 3.   Competitor A: Explanatory Power and Error Avoidance

*3.1   Introduction*

Let us examine the first competitor. As discussed above, elements reminiscent of the Wylie-Swoyer trade-off have frequently emerged in the recent debates of the meta-epistemological aspects of the scientific realism debate. In this section, I explain why this view is mistaken. My argument rests on three critiques of the Wylie-Swoyer analysis:

(i) Some realists and many anti-realists deny the value of explanatory power. Those positions cannot be captured by the Wylie-Swoyer analysis (subsection 3.2).

(ii) If we accept non-factive explanations as valid, then a disconnect arises between truth and explanation (subsection 3.3).

(iii) By deeming the Wylie-Swoyer trade-off fundamental and thus assigning fundamental epistemic value to explanatory power, we end up with a flawed epistemology (subsection 3.4).

Next, I will explore the precise role of explanatory power, arguing that it might be instrumentally valuable rather than an end in itself (subsection 3.5).

### 3.2 *Denying the Value of Explanatory Power*

The central issue in the epistemological scientific realism debate is the justification of beliefs about unobservables. Typically, unobservables are regarded as explanatory postulates. This aligns with the most prominent argument for scientific realism—the no-miracle-argument—which in turn is based on an abductive explanatory inference. Hence, for realists, believing truths often means believing true explanations of phenomena.. This viewpoint is not universally shared, however; various realists and a significant portion of anti-realists reject it.

Certain realists put forth arguments for unobservable entities that do not necessarily serve an explanatory function, or whose explanatory status might be doubted. Examples include accounts that do not depend on IBE, such as Hacking's (1983) entity realism. In this context, the rationale for asserting the existence of certain entities is based not on explanatory reasoning, but on the extent to which they can be subjected to pre-theoretical causal manipulation.[10] Crucially, many anti-realists do not think that explanatory power has any value. For example, van Fraassen contends that empirical adequacy constitutes the whole of a scientific theory's epistemic value. In his view, providing an explanation for the phenomena "really does not matter to the goodness of the theory, nor to our understanding of the world" (van Fraassen 1980: 24). This view comes in two flavors. First, there are anti-realists who think that explanations should not play a role in anyone's epistemic reasoning and thus that realism is generally mistaken. Second, there are voluntarist anti-realists, such as van Fraassen himself, who think that it is permissible for realists to value explanatory reasoning. The non-permissive instances especially pose a problem for the fundamental ontological trade-off proposed by Wylie and Swoyer. Their approach was intended to offer a comprehensive meta-

epistemological understanding of the contention between realist and anti-realist positions. They explain what is at stake as a simple trade-off between explanatory power and error avoidance. However, given that major accounts both on the realist and anti-realist side are not permissive towards explanatory reasoning, such a trade-off cannot capture the whole spectrum of the debate. *VTE*, the epistemological trade-off that I introduced, is more basic and has enhanced generality because it does not rely on explanatory power having fundamental value and thus can capture all of these accounts.

Voluntarist anti-realists who are permissive towards the use of explanatory reasoning, such as van Fraassen, could be viewed as a limiting case for the Wylie- Swoyer trade-off. They place no value on explanatory power, but allow realists to value it to varying degrees. Note that such anti-realists need to expand their fundamental values beyond simply avoiding error. Not doing so would lead to radical skepticism, since avoiding error as sole fundamental value is best promoted by not believing anything. However, scientific anti-realism is not supposed to be radical skepticism. In fact, constructive empiricists even believe in unobserved observables. Hence, for those anti-realists there must be some other positive value besides error avoidance. The positive value they typically advance is empirical gain. This then leads to the view that realists and anti-realists have completely incommensurable positive values (explanatory power vs. empirical gain). I will discuss this view in detail in *section 4*. Another possible positive value is simply *believing truths*, i.e., the *VTE* picture, which both realists and anti-realists can share.

I want to expand on the greater generality of *VTE* from the realist side. It does not require us to assume that all unobservables considered by realists serve an explanatory purpose. Nor does it require defining realism in terms of treating unobservables as explanatory postulates. On the anti-realist side, the view does not require us to accept that explanations add something of value to science. *VTE* simply posits that believing in relevant truths and avoiding errors have fundamental epistemic value. This framework is also more general in that it can

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10. But note that one major objection against Hacking is precisely whether causal manipulability can be theory independent in the relevant way, and if not, then there is a form of *IBE* hidden after all (cf. Resnik 1994). I am merely reporting here that some realists will not accept viewing the trade-off in terms of explanatory power.

encompass the Wylie-Swoyer trade-off as a specific instance in which true believing coincides with believing true explanations. As such, the general framing of *VTE* will be attractive for a much wider range of realists and anti-realists. Not only does it bring the values of a wide array of realists and anti-realists under one banner, it also allows comparisons between them.

Establishing true believing and avoiding errors as fundamental epistemic values does not inherently favor any position and serves as a neutral starting point for the debate. In this sense, *VTE* is more impartial and therefore advantageous.

### 3.3 Denying Factive Accounts of Explanation
The Wylie-Swoyer trade-off encounters another challenge from skeptics who doubt the factive nature of explanations. According to them, explanations do not need to be true to serve their intended purpose in scientific inquiry.[11] This weakens the link between explanation and truth. Others might view explanations as a combination of constructive and referential parts. Elaborating on how the concept of explanation relates to epistemic risk on such accounts may prove to be a formidable undertaking, even though the underlying notion that greater epistemic risk corresponds to greater explanatory power continues to hold. The problem, however, is that now those explanations can be successful without being true, which is in tension with the realist perspective. This would make it difficult to spell out the connection between explanation and the realist's beliefs. As a result, the debates about explanation and about scientific realism could even proceed largely independently of each other.

Realists might avoid this challenge by claiming that the connection exists only between *true* explanations and their beliefs. However, this introduces the issue of distinguishing between successful, non-factive

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11. Hacking (1983), for instance, completely distrusts *IBE*. Cartwright (1983: 57-60) and Ellis (1990: 25), on the other hand, propose a factive treatment of causal explanations, but a non-factive one for non-causal explanations. For a discussion, see Suárez (2008) and Egg (2017).

explanations and those that are both successful and true. If explanations can be successful without being true, then realists must either (1) develop additional criteria to identify true explanations within non-factivism or at least justify why the usual criteria still hold even though successful explanations can now be false or (2) concede that successful explanation is not a reliable guide to truth. Both options introduce new challenges: the former requires a robust account of how truth is established for non-factivist explanations, while the latter might undermine the no-miracle argument. Thus, for non-factivists, it might be more natural to move away from explanatory versions of realism altogether.

Conversely, my approach of viewing the fundamental trade-off in the realism debate as a balance between believing truths and avoiding error is independent of the whole discussion about explanation. It therefore sidesteps all these problems. Thus it is attractive for the whole spectrum of accounts of explanations or skepticism thereof. While it is possible to incorporate an explanatory account, such as the causal mechanistic model mentioned earlier, into the *VTE* framework, this is not mandatory.

In the next subchapter, I argue that the fundamental epistemic trade-off is not only broader in scope but explain why the Wylie-Swoyer account will lead to defective epistemic reasoning. I will argue that explanatory power either has a non-epistemic component or is merely a means to arriving at the truth.

### 3.4 Explanatory Power Cannot Have Fundamental Epistemic Value
Let us investigate the implications for our norms of belief if we view explanatory power as fundamentally epistemically valuable in addition to truth. Consider the *Solar Neutrino* case again. For the evidentialist, suppose the evidence suggests that it is slightly more likely that solar neutrinos do not exist. For the process-reliabilist, suppose the belief that solar neutrinos do exist is formed according to a slightly less re-

liable belief-forming process than the belief that they do not.[12] Notice too that the non-existence of solar neutrinos does not explain much.[13] On the other hand, their existence explains various phenomena, such as the mass loss observed in a collapsing star. When one focuses solely on the truth aim, belief in solar neutrinos has marginally negative expected epistemic value.. If we now add explanatory power as a fundamental goal in addition to true believing, then by believing in solar neutrinos, we would additionally realize the epistemic value of potentially arriving at a true explanation. Both the truth and explanatory goals can be achieved! This additional boost in epistemic value would tip the scale towards believing in solar neutrinos, given that our obligations to believe are guided by the principle of maximizing expected epistemic value.

What should we think about this line of reasoning? From the evidentialist perspective, obligations to believe arise from how our beliefs relate to the evidence. And given the evidence, we should not believe. Something similar can be said for the process-reliabilist. From the epistemological point of view, there is something wrong with giving explanatory power fundamental epistemic value. I think this thought also underlies van Fraassen's considerations when he says: "To believe is at least to consider more likely to be true, than not" (van Fraassen 1989: 142). He later expands on this idea as follows:

> [*Angel.*] In the strict sense, a reason to believe a given theory, say, must be something that makes that theory more likely to be true. I cannot coherently say, for example, ' 'I believe in angels, for that belief has great therapeutic value for me, but I agree that such a therapeutic value does not make the existence of

angels any more likely. [...] For the very point of belief is to have something, some picture of what things are like, of which we can say: that is how I think it is, period. (van Fraassen 2002: 89)

When speaking about reasons to believe in terms of therapeutic value, we clearly shift from epistemic to practical reasons. In the case of explanatory power, it might be less clear what exactly got added to the purely epistemic value of the truth goal, but the principle behind it is the same. I cannot assert that I believe in solar neutrinos because they possess significant explanatory power while simultaneously acknowledging that such explanatory power does not increase the likelihood of their existence. If we factor in everything that we think should inform us about the truth of whether solar neutrinos exist (the evidence, the reliability of our methods, etc.) and the outcome is that it is more likely that they do not, then adding that their existence is explanatory cannot suddenly justify our belief. Consequently, explanatory power cannot be a fundamental epistemic goal. It would give us the wrong verdict in the *Solar Neutrino* case, which is, of course, easily generalizable to a large variety of ontological commitments in science.

### 3.5 *The Correct Role of Explanatory Power*

Denying that explanatory power has *fundamental* epistemic value does not imply that it has *no role* in epistemic reasoning. The potential reason for incorporating explanatory power into our epistemic reasoning is the consideration that explanatory power serves either as a means to truth or as an indicator of it. (This is, of course, controversial as well.) Notice that this explanation for the epistemic value of explanatory power is very different from van Fraassen's *Angel* case. In the *Angel* case, therapeutic value is clearly not a means to truth. Explanatory power, on the other hand, might be—it might even be part of our evidence. In fact, this is what realists typically think. Psillos (2005: 398) states that the explanatory criterion is "the only workable criterion of reality". In line with Psillos, most realists expect explanatory reasoning

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12. Here I have chosen the two most common methods of justification, but the story can easily be told using other versions as well.
13. One could argue that the non-existence of solar neutrinos can explain various things, e.g., the lack of evidence for their existence. This complicates the story only slightly. In this case, suppose that their existence explains much more than their non-existence, e.g., the mass loss of a collapsing star. If neutrinos did not exist, this fact would go unexplained.

to yield substantial ontological commitments, with many even arguing that explanatory power is itself evidential. As Chakravartty (2017: 3.2) observes: "Many realists contend that other considerations—most prominently, explanatory considerations—play an evidential role in scientific inference." (Chakravartty 2017: 3.2) This is not in tension with my account, since we typically gather evidence *for the truth*. Therefore explanatory considerations can simply be that—a guide to truth. In this case, we want to include explanatory power in our epistemic reasoning, not because it has fundamental epistemic value, but because it is a *means* to truth, and we include it *only* because of that. But note that, as discussed, two groups of philosophers would deny even the instrumental value of explanatory power: those who argue that it has no value and those who argue that explanation can be non-factive.

### 3.6 Reply to Objections and Pragmatic Concerns

An objector might insist that they do not want explanatory power to be a mere means to truth but instead serve a different, non-truth-related role. Maybe they have practical or ethical concerns, or this is just one of their personal goals that they find by itself valuable. In this case, I would not tell them what they should or should not desire or which goals they should or should not have. All I want to say is that they have left the realm of epistemology, because their norms of belief are no longer directed solely towards the (relevant) truth-goal. This does not mean that belief formation, revision, and maintenance cannot reasonably be informed by non-epistemological concerns. . I do not want to exclude reasoning like, for instance, the reasoning of the pragmatist, from the get-go. All things considered, it might be reasonable to believe in angels given the *Angel* case or solar neutrinos given the *Solar Neutrino* case. From the evidentialist tradition, spanning from Clifford (1877) to Feldman (1988), this is viewed as mistaken. The process-reliabilist tradition, starting with Goldman (1979), considers it a mistake as well, since belief-forming processes should be reliable and reliability is merely a means to truth. However, there is also a tradition

that acknowledges the influence of practical concerns on belief norms. William James serves as a prime example. However, while James allows for practical considerations, he does not advocate going against the evidence. Rather, he suggests that in cases of inconclusive evidence, practical considerations can determine how risk-averse one should be. James calls for tolerance of one's value choices in such situations.

My argument thus far has aimed to conceptually separate epistemological concerns, which pertain to norms of belief aimed at the truth goal, and non-epistemological concerns, such as practical or ethical considerations. Overall, however, non-epistemic concerns can indeed influence what we should or should not believe. Typical cases are situations in which ethical considerations of what we should believe come into conflict with epistemic ones.[14] Such cases make one wonder what we should believe *overall*. I think the answer is that we are pursuing our epistemological endeavors as a means to our practical endeavors, and thus ethics always trumps epistemology.[15] As argued by various epistemologists (cf. Alston 1988: 258; Briesen 2016: 277; David 2005: 375), if we think epistemic obligations to believe are absolute obligations, then we are conflating epistemology with ethics. Epistemic obligations are the ones that arise if we aim at truth. The reason why we aim at truth is, however, not itself an epistemological question but part of a different domain, such as ethics or pragmatics.

The crucial point is that *epistemological* frameworks should explain *epistemic* belief obligations entirely in terms of *cognitive* aims. This is what *VTE* does. However, this does not negate the potential need for another framework that addresses how practical and ethical aims are relevant for our overall norms of belief. These perspectives can diverge, and it is vital to differentiate them to avoid misunderstandings. In our example, from a purely epistemological perspective, we should not believe in the existence of solar neutrinos or angels. But, once we es-

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14. See, e.g., Alston (1988: 258); Briesen (2016: 277); Broome (2013: 27).

15. The alternative is that truth is itself of final value, as argued by Lynch (2004), see also Moore's (1912) value pluralism, which allows epistemic and ethical values to be considered equally fundamentally valuable.

tablish this epistemological stance, we can then integrate practical considerations, and potentially arrive at a different conclusion. Practical concerns within the realism debate, however, are a different kind of question, though I will give some insights into them in the last chapter.

### 3.7 *Recap*

I argued that epistemically valuing explanatory power raises issues with non-factive accounts of explanations and accounts in the realism debate that do not value explanatory power. More importantly, once correctly explicated, explanatory power is either not epistemically valuable, or it is a mere means to truth, or it is valuable because of some non-epistemic interests.

### 4. Competitor B: Voluntary Stance Adoption

Let us move to the second competitor. Viewing the realism debate in terms of stances[16] is a major thread in many of van Fraassen's and Chakravartty's writings. Chakravartty (2017: 161) differentiates between three stances.

**The Metaphysical Stance** It is committed to positing explanations of the phenomena that go beyond the observable. This is a form of realism. Chakravartty commits himself to this stance.

**The Empirical Stance** It stays uncommitted towards anything unobservable. This is a form of anti-realism. Van Fraassen commits himself to this stance.

**The Deflationary Stance** It deflates the "received" putatively realist or

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16. Van Fraassen (2002) introduced the notion of a STANCE to the realism debate. A precursor is Carnap (1937: 3; see also 1956: 218). For them, empiricism is not a set of beliefs but rather something non-doxastic and non-cognitive. Van Fraassen (2002: 48) calls it a "stance" pertaining to a collection of "attitudes, commitments, values, goals". Teller (2004) introduced the analogy between stance and epistemic policy (see also Lipton 2004: 148), and, similarly, Psillos (2021: 17) calls a stance a "blueprint for an epistemic policy".

anti-realist discourse. Carnap is a prime example of a philosopher who is committed to reinterpreting the meaning of theoretical terms in observational language.[17]

Given its resemblance to my proposition, it is worth noting that the empirical stance is sometimes also articulated as a form of trade-off—an empiricist values empirical gain while simultaneously aiming to mitigate errors (see e.g., Van Fraassen 1980: 72 and Ladyman, Douven, Horsten, and van Fraassen 1997: 316). Empirical gain means cognitive gain restricted to the observable world. On the empiricist stance, there is no empirical gain that can be achieved by believing in the existence of unobservables. Therefore, as there is substantial risk of error, the belief in unobservables is never justified. Kukla (1994 967) contends that this argument begs the question against many realists. Realists may simply prioritize values other than empirical gain, such as explanatory power. Kukla asserts that advancing this argument against realists is circular reasoning. Ladyman, Douven, Horsten, and van Fraassen (1997: 316-7) reply that this is a misunderstanding. Van Fraassen's argument does not aim to discredit realism, but rather to provide an alternative approach to scientific inquiry that emphasizes empirical adequacy over postulating unobservable entities. Therefore, it would be incorrect to interpret his argument as an attack on realism. The argument should simply demonstrate that one has the option of being an empiricist, and that there is no epistemic obligation for empiricists to believe in the existence of unobservables. Van Fraassen (1989; 2002: 81-89) concludes that stances are not doxastic or fact-based, but rather express commitments, choices, and desires. Rationality alone does not determine these. As a result, van Fraassen argues for epistemic voluntarism, a view Chakravartty (e.g., 2018: 233) also advances, which

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17. Van Fraassen (2002) differentiates between what he calls an "empirical stance" and a "materialist stance". While the empirical stance equates Chakravartty's description, the material stance is specifically committed to accepting the ontological commitments of our current best sciences. Ladyman (2011) adds a naturalistic "scientist stance" which performs a dialectic between the empirical and the materialistic stance.

holds that rationality permits a range of stances in the scientific realism debate. This view can be referred to as a meta-epistemology[18] that accounts for the stalemate in the realism debate by suggesting that realists and anti-realists hold different epistemic values, and that there is no decisive, rational way to adjudicate between them.

Furthermore, it is often argued that stances are incommensurable because traditional arguments in the scientific realism debate are ultimately inconclusive. For instance, Worrall (2000) and Chakravartty (2018: 226-227) suggest that the miracle argument, is not truly an argument since "such argument, if valid, would inevitably include, either explicitly or implicitly, an assumption that prejudges the issue" (Worrall 2000: 230). Some argue that a similar critique applies to the pessimistic induction, as it presupposes either realist or anti-realist interpretations of the evidence. Van Fraassen notes that he is "proud never to have relied on the so-called Pessimistic Induction" (van Fraassen 2007: 347).

I agree that viewing the realism debate as a battle between incommensurable stances is another way of straightforwardly explaining the stalemate. However, I will now argue that this picture is at least incomplete. There are several ways to disambiguate the incommensurable stance view, each corresponding to different value frameworks. These frameworks come with value choices—such as prioritizing believing truth or avoiding error, which motivate different accounts in the realism debate. I have already criticized the idea that the framework is a trade-off between explanatory power and error avoidance. Now, I will argue something similar for the trade-off between empirical gain and error avoidance. I propose that embedding the adoption of stances within a *VTE* framework offers the most plausible explanation and motivation for account choice. Let me start with non-voluntarist anti-realists before moving on to the voluntarists. Non-voluntarist anti-realists cannot base their argument on a trade-off between error avoid-

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18. More precisely, the meta-epistemological commitment is that rationality is exhausted by respecting probabilism and logical consistency.

ance and empirical gain because that would indeed be circular reasoning as Kukla asserted. The value needs to be more general so that realists and anti-realists can agree on an epistemic starting point. By committing to the unrestricted truth-goal as fundamentally valuable, anti-realists can argue non-circularly against realists. The contention of such non-voluntarist anti-realists who accept *VTE* is then that one commits too many errors by believing in unobservables (e.g., the methods of acquiring such beliefs are not reliable). Adopting the fundamental trade-off between believing truth and avoiding error allows anti-realists to argue against realists, thereby potentially mitigating some aspects of the stalemate. In this case, *VTE* has increased generality and impartiality compared to the trade-off in terms of empirical gain. Non-voluntarist anti-realists cannot advance empirical gain as fundamentally valuable without circular reasoning.

But what about voluntarist anti-realists? Is it reasonable for them to adopt empirical gain as their fundamental positive value? One might think that realism follows from the metaphysical stance and its values and that anti-realism follows from the empirical stance with its values. This raises the question: Why adopt the empiricist values that lead to anti-realism? Ladyman/Douven/Horsten/van Fraassen (1997: 317) argue, for instance, that a constructive empiricist and a realist interpretation of the Stern-Gerlach experiment would yield the same data. Thus, there is nothing to gain from the realist stance. They generalize this and conclude: "So van Fraassen rejects realism, not because he thinks it irrational, but because he rejects the 'inflationary metaphysics' that must accompany it, i.e., an account of laws, causes, kinds, and so on" (Ladyman/Douven/Horsten/van Fraassen (1997: 317).

What is the basis for rejecting realism here? Note first that whatever it is, it cannot be anything to do with practical goals, such as increased efficiency. In the *epistemological* realism debate, the focus is on cognitive aspects. From a purely epistemological point of view, the question is why someone would adopt a stance that limits cognitive gain to empirical gain, i.e., to the observable world. We also already saw that the reason cannot be irrationality, since van Fraassen agrees that the realist

is rational. I now offer a reason for adopting the empirical stance. It is based on *VTE* and shows how *VTE* can provide both the motivation and explanation for adopting the empiricist stance.

Suppose we lived in a world where knowledge about unobservable entities—such as electrons, Higgs bosons, or dark matter—was as accessible as our knowledge about observables like tables, chairs, and trees. In such a context, would anyone continue to hold an empiricist stance and abstain from seeking knowledge about unobservables? Setting aside practical considerations, this seems nonsensical from a purely cognitive perspective for at least two reasons:

(i) *Nature of Knowledge:* The pursuit of knowledge is often driven by curiosity and the need to understand the world around us comprehensively. If knowledge of unobservables was as accessible as that of observables, ignoring it would be akin to willingly turning away from a vast expanse of knowledge that is readily available.

(ii) *Cognitive Dissonance:* From a knowledge-seeking standpoint, we do not want to introduce unnecessary distinctions without epistemic differences. If we could understand both the observable and unobservable with equal clarity, cherry-picking which truths to accept would introduce an unnecessary cognitive dissonance. Accepting knowledge about chairs but rejecting knowledge about electrons, despite both being equally accessible, would create a distinction without an epistemic difference.

If this is correct and the empiricist stance has no appeal in the hypothetical world but does have appeal in our world, then the appeal must be explained by a feature of our world that is not a feature of the hypothetical world. According to the setup of the hypothetical scenario, this feature must be the *epistemic difference* between observables and unobservables. The scenario shows that without such a difference, there would be no motivation for the empirical stance. This means that for the empiricist stance to be motivated, there must be concerns about the epistemic security of our beliefs in unobservables that we do not have in relation to observables. In other words, there must be more frequent,

or even categorical, epistemic issues associated with the unobservable realm compared to the observable. If this is correct, then the primary reason for adopting the empirical stance must revolve around the error rate. The well-motivated way to view voluntarist anti-realists, then, is as being more risk-averse than realists—compared to realists, they assign higher value to avoiding error and lower value to believing truths compared to realists.

This delineates the epistemological trade-off in terms of *VTE* as being more fundamental than the choice between stances, such as the realist or the empiricist stance. The risk-averse value choice within *VTE* offers a very plausible explanation and motivation for the adoption of the empirical stance.

In sum, non-voluntarist anti-realists cannot view empirical gain as fundamentally valuable as it would beg the question against various realists. Viewing empirical gain as fundamentally valuable is really the anti-realist flip side of realists who view explanatory power as fundamentally valuable. Viewing relevant true beliefs and avoiding error as fundamentally valuable initially does not favor any stance; it is a non-question-begging neutral starting point to the debate. For voluntarists, a *VTE* framework in which some individuals select a stance that prioritizes avoiding error offers an explanation and motivation for why they then adopt an anti-realist position. One does not start with excluding unobservables from the outset; instead, this follows from making the risk-averse value choice. The voluntarist aspect will be preserved by the choice of (low) epistemic risk, while allowing realists a more risk-tolerant attitude.

## 5. Results

I argued that participants in the realism debate should adopt an epistemology that sees our epistemic activities as searching for a trade-off between believing truths and avoiding error. Adopting a perspective that regards the fundamental trade-off between explanatory power and error avoidance results in flawed epistemic reasoning. For non-voluntarists, perceiving the fundamental trade-off between empirical

gain and error avoidance begs the question against realists. In the case of anti-realist voluntarists, *VTE* offers a plausible explanation of the anti-realist sentiment based on a risk-averse value choice. *VTE* provides increased generality and is a non-question begging neutral meta-stance for the debate—one both realists and anti-realists can endorse.

## 6.  Prospects

This has important consequences for the stalemate within the debate. Viewing the *fundamental* trade-off between explanatory power and error avoidance, empirical gain and error avoidance, or viewing the debate as a clash between incommensurable stances, builds the stalemate into the debate. Switching to *VTE* provides a meta-stance on which both realists and anti-realists can agree. The value disagreement then is only about balancing, which provides common ground for various realist and anti-realist positions. By contrast, viewing the trade-off in terms of explanatory power or empirical gain promotes steadfast reasoning, which allows participants to maintain their stance without seriously engaging with historical evidence of theory change. After all, no matter what such evidence shows, if empirical gain has exclusive value, then you should not believe in unobservables, and if explanatory power is given primary value, then you should believe in unobservables. *VTE* breaks with such reasoning since one needs evidence to judge the error rate of one's beliefs. Such a reorientation of the realism debate is currently underway, especially since Stanford (2006), and *VTE* shows that we are well advised to go further down on this path. As such, *VTE* not only explains the stalemate but also has the potential to mitigate it. However, this approach also has its limits. If arguments based on historical cases assume, at least to some extent, realist or anti-realist ways of reading the historical evidence, then one's value commitments will influence one's assessment of error rates, and some aspects of the stalemate are likely to persist.

This leaves us with the question of *balancing*. And here, in philosophy as in daily life, it is a matter of personal preference how much risk one is willing to take on. Voluntarists generally agree that agents need to conditionalize on their values and cannot dogmatically insist that their values are superior. The considerations of *VTE* provide a novel motivation of why we end up at a permissivist attitude concerning stances: the purely epistemological point of view is concerned with instrumental rationality, i.e., whether one takes the right means to achieve one's epistemic ends. This reveals that epistemology cannot reach beyond itself to provide epistemic reasons concerning the balancing of the truth-goal itself. Whether one should be a more risk-averse or risk-tolerant epistemic agent cannot be a question of epistemology.

However, such permissivism is not the end of the realism debate. Instead, I suggest that this marks a shift to a pragmatic debate. Without epistemic reasons for balancing, it must come from second-order ethical or practical goals. For instance, anti-realists might argue that risk-tolerant strategies can lead to funding research projects that are too speculative at the expense of research with higher practical ethical value (cf. Cartwright 1999: 18), while realists might argue that high risk-aversion might discourage scientists or lead to a detrimental distrust in science (cf. Brown 2001). Furthermore, a plurality of accounts might be the best critical practice (cf. Ratcliffe 2011: 128-9; Kelly 2010; Kvanvig 2014) to map the landscape in more detail, make the choices clearer, and highlight how the different accounts relate to the historical evidence, and how they can be confirmed or disconfirmed by it. Also, since epistemic reasons for balancing are limited, our theories of rationality should reflect an attitude of tolerance, such that enquirers are more open to rival accounts.

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