

Chapter 6

Perspectives, Questions, and Epistemic Value



Kareem Khalifa and Jared Millson

Abstract Many epistemologists endorse true-belief monism, the thesis that only true beliefs are of fundamental epistemic value. However, this view faces formidable counterexamples. In response to these challenges, we alter the letter, but not the spirit, of true-belief monism. We dub the resulting view “inquisitive truth monism”, which holds that only true answers to relevant questions are of fundamental epistemic value. Which questions are relevant is a function of an inquirer’s perspective, which is characterized by his/her interests, social role, and background assumptions. Using examples of several different scientific practices, we argue that inquisitive truth monism outperforms true-belief monism.

Keywords Perspectivism · Questions · Epistemic value · Modeling · Idealization · Truth · Belief

6.1 Introduction

We place a great deal of value on inquiry’s deliverances. From finding one’s keys to discovering the Higgs boson, our quest for knowledge and other cognitive goods is a staple of the human condition. For this reason, epistemologists have increasingly attended to questions of *epistemic value*.¹ A central debate is whether everything that is epistemically valuable bottoms out in true belief’s value. Call those who take true belief as the fountainhead of all other epistemic value *true-belief monists*.

True-belief monists are hard-pressed to account for science’s many facets. For instance, their narrow edifice seems ill-positioned to explain the complexity of epistemically valuable undertakings characterizing the scientific endeavor. If such

¹Pritchard, Turri, and Carter (2018) review the relevant literature.

K. Khalifa (✉)
Middlebury College, Middlebury, VT, USA
e-mail: kkhalifa@middlebury.edu

J. Millson
Agnes Scott College, Decatur, GA, USA

worries are well-placed, then true-belief monism is insufficient to account for the epistemic value animating scientific activity. However, we shall focus on whether true-belief monism is necessary for accounting for science’s epistemic goods. Several scientific practices involve idealizations (which are false), rely heavily on models (which are frequently, if not fundamentally, non-propositional), and traffic in public, intersubjective representations (and are thereby non-doxastic). For these reasons, one might think that either a pluralistic approach to epistemic value (Pedersen 2017) or a monism that prizes a more flexible epistemic status—such as understanding (Elgin 2017)—should supplant true-belief monism.

In this paper, we have two goals. First, we will clarify scientific challenges to true-belief monism’s claim to provide necessary conditions on epistemic value. Second, we will argue that while the letter of true-belief monism is not defensible, a near-neighbor that retains its spirit is. To that end, Sect. 6.2 offers a more precise definition of true-belief monism. Section 6.3 presents our successor position, *inquisitive truth monism*, according to which the ultimate bearers of epistemic value are true answers to relevant questions. Sections 6.4 and 6.5 then show how inquisitive truth monism outperforms true-belief monism in accounting for science’s epistemically valuable facets. Finally, one of our boldest departures from true-belief monism is our reliance on *perspectives* to determine which questions are relevant to a given inquirer. For this reason, Sect. 6.6 defends our perspectivism against several potential objections.

6.2 True-Belief Monism

To set the stage, we define true-belief monism as follows:

True-Belief Monism (TBM): For all x , x is epistemically valuable only if:

1. x is a true belief, or
2. x is a means to acquiring true beliefs, or
3. x ’s epistemically valuable components are either true beliefs or a means to acquiring true beliefs.²

True-belief monists include Ahlstrom-Vij (2013), David (2001), Goldman (1999), Olsson (2007), and Sosa (2003). Sometimes, this doctrine is put in terms of true belief being the only “fundamental epistemic value” (Ahlstrom-Vij and Grimm 2013). So far as we can tell, TBM’s three conditions capture this sense of fundamentality. Corresponding to these conditions are three strategies for true-belief monists to account for epistemically valuable states of affairs. First, per TBM1, whenever something is deemed epistemically valuable because it is a true belief, we will call this the *basic TBM strategy*. Second, whenever true-belief monists account for

²Because we only discuss whether true-belief monism imposes *necessary* constraints on epistemic value, TBM is not formulated as a biconditional; ditto for inquisitive truth monism.

something's epistemic value by way of TBM2, we will call this *TBM's instrumental strategy*.³ In general, a state of affairs x is of *instrumental epistemic value* if it is a means to some other epistemically valuable state of affairs y . It is of *mere* instrumental epistemic value if this exhausts its epistemic value. True-belief monists hold that anything of mere instrumental epistemic value must ultimately be a means to acquiring true beliefs. Paradigmatically, many true-belief monists take justification to be of mere instrumental epistemic value.

Finally, per TBM3, certain epistemic statuses might have derivative epistemic value because their components submit to the basic and instrumental TBM strategies. Call the employment of this claim *TBM's componential strategy*. For instance, true-belief monists might argue that knowledge is of non-fundamental epistemic value because its only non-instrumental epistemic value is true belief, and its remaining components (e.g., justification, Gettier-resistance) are of mere instrumental epistemic value, i.e., are epistemically valuable only insofar as they are an effective means for acquiring true beliefs. Of course, this isn't the only way that TBM can account for knowledge's epistemic value; we use it simply for purposes of illustration.

6.3 Inquisitive Truth Monism

As already mentioned, we have sympathies with true-belief monism, but prefer a kindred position. To motivate this alternative, consider a metaepistemological question: What counts as evidence when adjudicating between competing accounts of epistemic value? Unlike more venerable philosophical topics, e.g., knowledge, truth, goodness, beauty, etc., the term "epistemic value" does not appear in ordinary talk, and our folkways do not make hard and fast distinctions between epistemic and other kinds of value. So, it's unclear which intuitions, practices, etc. matter when claiming that something is or is not epistemically valuable. This makes it too convenient to discard hard cases as lacking in epistemic value (e.g., as merely pragmatic). Furthermore, like many human endeavors, links of causation and covariance are noisy and underdetermined by armchair observations. Consequently, it is too easy to provide just-so stories about how something could be a means to one's favored epistemic good.

Combined, these metaepistemological worries paint an unflattering portrait of discussions concerning epistemic value. For instance, true-belief monists can run their three strategies in fairly unconstrained, *ad hoc* ways, and then discard the remaining cases as non-epistemic on fairly unprincipled grounds. Fortunately, epistemic value theorists in general, and true-belief monists in particular, broadly agree on one pre-theoretic consideration that fixes the reference of "epistemic value"

³Throughout, we treat instrumental epistemic value as the main kind of derivative epistemic value. Our arguments would not be adversely affected if we countenanced other forms of derivative epistemic value, as Berker (2013) does.

(Ahlstrom-Vij 2013; Lynch 2004; Sosa 2003). Ahlstrom-Vij and Grimm (2013, 330) nicely summarize this idea:

... epistemic value is a function of the goals of inquiry, where ‘inquiry’ refers to the range of inquisitive practices concerned with the posing and answering of questions ... the goals of inquiry determine which activities, states, processes, practices, and so on are epistemically valuable.

In other words, the foremost “theory-neutral” way of determining whether something is epistemically valuable appeals to the goals underlying practices of asking and answering questions. Call this the *Intuition About Inquiry*. We will recruit this platitude to adjudicate between competing accounts of fundamental epistemic value via three interventions.

First, the Intuition About Inquiry suggests that closer attention to the semantics and pragmatics of questions and answers (Belnap and Steel 1976; Groenendijk and Stokhof 1984; Hamblin 1958; Millson 2014; Wiśniewski 1995) mitigates the aforementioned metaepistemological worry. This research clarifies these inquisitive practices and thereby promises to also clarify what is of epistemic value. Space being limited, we can only hint at the possibilities of this here. For present purposes, we adopt what is known as the ‘set-of-answers’ methodology in the logic of questions and answers, i.e., erotetic logic (Wiśniewski 2013). Following this approach, we treat interrogatives’ content as the set of their possible answers. We take possible answers to be propositions and thus conceive of questions as sets of propositions. This allows us to import various relations among questions and statements studied by Inferential Erotetic Logic (IEL) (Wiśniewski 1995, 2013); most importantly, that of erotetic implication (see below). For this essay’s purposes, ‘answer’ is shorthand for ‘possible answer’. We rest on readers’ intuitions about what counts as a possible answer to a question.

Second, the Intuition About Inquiry suggests that examining scientific inquiries—where inquirers are especially explicit about the questions they are asking and how they are coming to their answers—will further mitigate our metaepistemological worry. Sections 6.4 and 6.5 embrace this suggestion in full. Of course, scientific inquiries are not the *only* inquiries worth consulting. Rather, we merely suggest that scientific inquiries are especially useful in adjudicating between competing accounts of epistemic value.

Third, and most importantly, the Intuition About Inquiry hints at an alternative to TBM. It is a platitude that the goal of asking a question is answering it correctly. This suggests the following:

Inquisitive Truth Monism (ITM): For all x , x is epistemically valuable only if:

1. x is a true answer to a relevant question, or
2. x is a means to acquiring true answers to relevant questions, or
3. x ’s epistemically valuable components are either true answers to relevant questions or a means to acquiring true answers to relevant questions.

Like TBM, ITM admits of basic, instrumental, and componential strategies and prizes truth. However, TBM valorizes true *beliefs*, while ITM valorizes true *answers*

to *relevant questions*. As we shall argue below, belief is often ancillary to scientific inquiry. Conversely, true beliefs that answer no relevant questions fail to fulfill scientific inquiry's goals. As such, ITM enjoys certain explanatory advantages over TBM.

According to our brand of ITM, *perspectives* determine whether a question is relevant or not. Perspectives are combinations of an agent's personal interests, social roles, and background assumptions.⁴ We discuss each in turn. First, questions may be relevant because of inquirers' *personal interests*.⁵ Interests in questions' answers may serve some practical end, e.g., "Where is the rake?" Other questions might be sparked by interests that are less practical, e.g., mere curiosity.

Second, questions may be relevant because inquirers have *role-responsibilities* to answer them.⁶ Here, we adopt Hart's (1968, 212) account of role-responsibilities:

... whenever a person occupies a distinctive place or office in a social organization, to which specific duties are attached to provide for the welfare of others or to advance in some specific way the aims or purposes of the organization, he is properly said to be responsible for the performance of these duties, or for performing what is necessary to fulfill them.

As a simple illustration, John would be within his rights to ask his mechanic, Jane, why his car screeches when he makes left turns. Furthermore, Jane would be failing to fulfill her professional responsibilities if she refused to explain this to John. As such, her role-responsibility includes answering the question, "Why does John's car screech whenever he turns left?". The question is thereby relevant to Jane, even if she is not interested in the answer.

Finally, questions may be relevant in a 'derivative' sense, so to speak. For instance, suppose that the following question is relevant: "Is every member of the Edinburgh philosophy faculty Scottish?". Then each of the following questions are also relevant: "Is Michela Massimi Scottish?", "Is Nick Treanor Scottish?", etc. In IEL's parlance, the first "superquestion" *erotetically implies* the other "subquestions". So, relevant superquestions can "transmit" their relevance to subquestions via erotetic implication. Much like role-responsibilities, erotetic implications place inquirers on the hook for questions that they might not be interested in answering—or even aware of.

Importantly, erotetic implication can be far more sophisticated than the example above suggests. Erotetic implication frequently behaves nonmonotonically, which pairs naturally with it being sensitive to an inquirer's background assumptions (Millson 2019). For instance, suppose "Where is the rake?" is a relevant question

⁴Some might equate our notion of perspective with a "social-epistemic context". We have no quarrel with this way of speaking. However, because different scholars ascribe different meanings to the phrase "social-epistemic context", we seek to mitigate misinterpretation by construing perspectives in terms of personal interests, social roles, and background assumptions.

⁵Hereafter, the term "interest" is shorthand for "personal interest", and is meant to denote any interests that would not be "professional" or "social" interests falling out of role-responsibilities.

⁶Elsewhere (Millson and Khalifa [in press](#)) we argue for this position at length, but only with respect to why-questions. Nothing seems to prevent our arguments from carrying over to other kinds of questions, as we assume here.

and that the speaker remembers that her partner tends to leave the rake outside when in a rush. This question then erotetically implies the subquestion, “Was my partner in a rush?”. Since the background assumptions include the speaker’s memories, the inference can be overturned if it turns out that the speaker’s memory is unreliable. Importantly, we do not assume that background assumptions need to be true in order to generate relevant questions. We defend this position in Sect. 6.6.

To summarize thus far, we are proposing ITM in lieu of TBM. Its major difference is in replacing true beliefs with true answers to relevant questions as the locus of epistemic value. We are perspectivists about questions’ relevance, where agents’ perspectives include interests, social roles, and background assumptions. A question is relevant to an inquirer if she is interested in its answer, has a role-responsibility to answer it, or it is a subquestion that is erotetically implied by a superquestion (and her background assumptions) that is already relevant because of these interests and role-responsibilities. Thus, ITM implies that whether or not a truth is epistemically valuable depends on one’s perspective.

6.4 Characterizing Inquiry’s Goals

We begin by arguing that inquisitive truth monism (ITM) better describes scientific inquiry’s goals than true-belief monism (TBM). This argument rests on two claims.⁷ First, true beliefs that fail to answer relevant questions are not among inquiry’s goals. Second, some true answers to relevant questions need not be believed in order to serve as these goals. Consequently, ITM more faithfully describes inquiry’s goals than does TBM.

Begin with the first claim. According to the Intuition About Inquiry, we should consult our practices of asking and answering questions to determine what is epistemically valuable. True beliefs that answer no relevant questions seem to clash with this intuition and common sense, for belief in any true *non sequitur* would thereby function as a goal of inquiry. For instance, suppose that someone’s only true belief about the ideal gas law is that Clapeyron first formulated it in 1834, but she seeks to answer the question, “Why does the ideal gas law hold at low pressure and high temperature?”. Clearly, she has not met this inquiry’s goal despite having a true belief. Hence, absent ITM’s constraints, TBM fails to characterize inquiry’s goals. Moreover, note that the concept of relevance is precisely what is perspectival about ITM. Hence, ITM’s perspectivism makes all the difference in its superior coverage of inquiry’s goals.

Turn now to the second claim: that having a true answer to a relevant question without believing it can sometimes result in a successful inquiry. TBM denies that such inquiries are successful, while ITM strongly suggests that they are.⁸ However,

⁷We assume a fairly intuitive notion of belief. It exceeds the scope of this paper to see if conceptions of belief that eschew these intuitions (e.g., Hieronymi 2008) compete or complement ITM.

⁸ITM only suggests, but does not entail, this, because we are silent regarding epistemic value’s sufficiency-conditions.

some other cognitive attitudes toward a true answer appear to do just as well as belief in properly settling a scientific inquiry. ITM suggests that scientists who rightly believe an answer have nothing more epistemically valuable than scientists who, e.g., merely accept it. Here, we follow Cohen (1992) in defining *acceptance* as the adopting of a policy of including a claim as a premise in deciding what to do or think within a given context, where (as we see it) the most important things to “do or think” involve answering the relevant questions. While we focus on acceptance, there is no reason these points could not be extended to other attitudes. For instance, Buchak (2014) argues that credences are distinct from beliefs. If arguments such as hers are sound, then our remarks about acceptance carry over to credence. More generally, we might think of ‘having’ true answers to relevant questions as multiply realized by different kinds of mental states.

Leaving room for acceptance without belief accords well with scientific practice. Some notable scientists, including Ernst Mach, Karl Pearson, the young Einstein, Niels Bohr, and Milton Friedman, did not appear to believe some of their most notable scientific discoveries, but can plausibly be interpreted as accepting those results. Indeed, some have suggested that scientific inquiry *typically* involves acceptance rather than belief (Kukla 2015). By contrast, TBM implausibly implies that scientists who accept without believing answers possess nothing of epistemic value.

Importantly, our discussion of acceptance is just the tip of the iceberg: ITM is even more inclusive about the vehicle by which a true answer is delivered. Many scientific representations are public and intersubjective. Hence, they are not individual mental states. While this claim seems intuitive, it gains further traction when we consider that aside from recognition and esteem, scientific innovators have little in the way of property rights with respect to their discoveries (Merton 1942/1973). Similarly, paradigmatic uses of the term ‘scientific knowledge’ frequently refer to epistemic statuses that do not supervene on individual mental states (Bird 2010, Magnus 2013). Thus, if beliefs are individual mental states, then scientific inquiry frequently aims for something else.

In other words, scientific representations may be of a more public flavor than TBM would allow. Non-mental representations (such as declarative sentences) or speech-acts that need not express belief (such as public announcements) can also express answers to relevant questions, and our view takes them to be just as epistemically worthwhile as true beliefs. These different vehicles—sentences, public announcements, collective acceptance, and other kinds of “public answers”—show that answers to relevant questions need not wear the cloak of belief. Thus, unlike TBM, ITM has no difficulty in accommodating inquiries that have these intersubjective representations as their goal.

Taking stock, having true answers to relevant questions without belief can sometimes result in successful inquiry. Answers can be accepted without being believed, or can be public representations without expressing beliefs. Furthermore, the vehicle by which true answers are delivered is naturally thought to depend on one’s interests and social roles, i.e., one’s perspective. Hence, perspectivism once again is ITM’s lynchpin.

Yet, true-belief monists may resist our arguments about public answers in at least three ways. We anticipate and rebut these objections in what follows. First, true-belief monists may counter that, at root, scientists aim to have true beliefs, and that public answers are merely pragmatic side-effects of this true belief. Let *attitudinal ecumenicalism* denote ITM's ability to accommodate both doxastic and non-doxastic attitudes as goals of inquiry. Then this defense of TBM merely presupposes the falsity of attitudinal ecumenicalism without argument; it does not preclude the possibility that scientists sometimes aim to *accept* true answers. So, even if public answers are mere side-effects, it is not clear that they are mere side-effects of *beliefs*. Moreover, on this defense, TBM concedes that beliefs are causally efficacious in producing public answers. However, they then need to fend off an alternative interpretation: beliefs are a mere means to public answers. For instance, providing an answer as a public representation (e.g., a declarative sentence) frequently requires belief simply because one's role-responsibilities require sincere communication. In such inquiries, belief's value might be exhausted by this sincerity requirement.

Second, TBM's adherents may claim that inquiry sometimes aims at collective beliefs, and public answers ought to be collectively believed. After all, TBM says nothing about whether beliefs are restricted to individuals. However, this once again fails to counter attitudinal ecumenicalism, for belief is not the only attitude amenable to collectivization: collective acceptance, collective credence, etc. may sometimes serve as the aim of inquiry. Indeed, some compelling arguments suggest that collective acceptance is more apt to ascribe to groups than is collective belief (Wray 2001). Clearly, such arguments dovetail with our previous remarks.

Finally, TBM's defenders may treat public answers as a means to getting many inquirers to have true beliefs. Yet again, this does not address attitudinal ecumenicalism. In other words, purveyors of this defense owe some explanation for why public answers are a means to *beliefs* rather than to any number of other cognitive attitudes one may adopt towards true answers to relevant questions. Moreover, it suggests that scientists who had true but unpopular answers during their time—e.g., Nicolas Copernicus, Ignaz Semmelweis, and Rosalind Franklin—only succeeded in their inquiries when their respective scientific communities came around. By contrast, ITM more plausibly suggests that they succeeded when they correctly answered their inquiries' main questions, regardless of how slow their peers' uptake may have been.⁹

To summarize, true beliefs that fail to answer relevant questions are not goals of inquiry, since they would allow *non sequiturs* to serve as such goals. Conversely, some true answers to relevant questions—including accepted and public answers—need not be believed in order to serve as these goals. Consequently, ITM more faithfully describes inquiry's goals than does TBM.

⁹As before, ITM can only *suggest* this because we are not arguing for its sufficiency.

6.5 Scientific Practice

True-belief monism (TBM) and inquisitive truth monism (ITM) differ in subtle ways. In the prevailing literature on epistemic value, differences such as these are typically adjudicated by comparing competing views' accordance with relatively mundane epistemic practices, sometimes spruced up through the art of thought experiment. However, we shall take a different tack, as many of TBM's shortcomings accrue greater nuance when it is required to account for the epistemic value implicit in *scientific* practice. In what follows, we present three of these challenges—all concerning whether TBM imposes licit *necessary* conditions on epistemic value—and show that ITM succeeds where its forbear fails.

6.5.1 *Non-Propositional Representations*

Both TBM and ITM require epistemic value's locus to be propositionally structured. By contrast, the vehicles of scientific representation are theories, models, diagrams, and so forth. None of these representations are naturally glossed as propositions. As we saw, TBM has three ways of accounting for epistemic value. We shall now argue that the basic and componential TBM strategies fail to account for scientific representations' epistemic value, and that TBM's instrumental strategy is less plausible than its ITM counterpart. Moreover, ITM's greater plausibility in this context is an instance of a broader argumentative strategy.

Begin with TBM's basic strategy, which holds that these sundry scientific representations are in fact true beliefs. As mentioned above, scientific representations are frequently non-propositional. On the leading accounts, scientific representations are models. For those of a more structuralist bent, models are set-theoretic structures (van Fraassen 2008). Such structures are neither true nor false, and, for this reason, are not propositional. However, even non-structuralist accounts of scientific representation renounce the idea that models must be propositional (Giere 2006, 64–65; Suárez 2012, 216–217; Weisberg 2013, 22).

TBM's componential strategy looks equally unpromising, for true beliefs are not components of scientific representations. Indeed, in the scientific inquiries that do result in belief, the exact opposite is true: scientific representations are the epistemically valuable components of the relevant beliefs. Since scientific models frequently lack propositional structure, one cannot simply 'believe a model'. Rather, one must believe *that* a model is, for example, accurate. However, this implies that models are contents—'components', so to speak—of their attendant beliefs. Parallel points apply to other scientific representations, such as theories and measurements.

While TBM's basic and componential strategies are nonstarters, its instrumental strategy contains a grain of truth. On this line, such representations are not goals of

inquiry unto themselves. Rather, they are a means to acquiring true beliefs.¹⁰ We agree that, insofar as scientific representations are non-propositional, they are merely a means to fulfilling inquiry's goals. However, our instrumental strategy suggests that representations are not a means to acquiring true beliefs, but a means to providing true answers to relevant questions. For instance, x-rays are a means to answering the question, "Is the patient's bone broken?". In a similar vein, statistical mechanics is a means to answering questions such as, "How do ions, atoms, and molecules vibrate within crystals?", "How do intermolecular forces affect the thermodynamics of gases?" and so on.

We can clarify ITM's instrumental strategy. Even when construed non-propositionally, scientific representations are widely thought to support "surrogative inference"; very roughly, competent and informed users can take propositions about the representational source as premises and draw valid conclusions about the target (Suárez 2002). Surrogative inferences are sound when their conclusions are true. Thus, a scientific representation, *A*, of a target, *B*, is epistemically valuable in context *C* just in case the sound surrogative inferences from *A* to *B* have conclusions that correctly answer every relevant question in *C*. In this way, ITM's instrumental strategy accommodates non-propositional representations. Moreover, Sects. 6.5.2 and 6.5.3 show that questions' relevance—and, by implication, ITM's perspectivism—is crucial in accounting for different modeling practices' epistemic value.

We think that ITM's instrumental strategy is more plausible than TBM's. Section 6.4 provides a simple explanation: precisely because ITM better characterizes inquiry's goals than TBM does, ITM's instrumental strategy will outperform its TBM counterpart (*ceteris paribus*). Specifically, TBM's instrumental strategy counsels scientists to pursue the most effective means to acquiring true beliefs, regardless of whether those true beliefs answer any relevant questions. Thus, just as *non sequiturs* were problems for TBM in Sect. 6.4, non-propositional representations that are a means to these *non sequiturs* will pose problems for TBM's instrumental strategy in this discussion. Similarly, just as true answers that were accepted or publicly implemented posed problems for TBM above, non-propositional representations that yield true answers to relevant questions but are 'merely' accepted or publicly implemented will be denied the epistemic value that they deserve. Nor are these problems peculiar to non-propositional representations: they will arise in any case where ITM's strategy is (*ceteris paribus*) the same as TBM's. Whenever this arises, we'll call it ITM's *axiological advantage*.¹¹

¹⁰Of course, scientists sometimes treat these representations as goals of inquiry. Insofar as they do, such representations are proximal or subgoals of a more fundamental or overarching goal. TBM takes this more fundamental goal to be true beliefs; ITM, true answers to relevant questions.

¹¹Ahlstrom-Vij & Grimm (2013) hold that accurate representations, rather than true beliefs, are of fundamental epistemic value. While their view ably handles non-propositional representations, it requires an individual mental state—the "grasp" that is characteristic of understanding. Hence, their view cannot account for public answers, and thereby does not fully overcome ITM's axiological advantage. Furthermore, we are skeptical that such non-propositional grasping is essential to understanding (Khalifa 2017, 72–79).

To summarize, science provides some of our most exemplary kinds of inquiries. Frequently, these inquiries attain their goal by hitting upon accurate representations—theories, models, and the like—that are not propositions. According to ITM, such representations are a means to answering relevant questions, and are thereby of instrumental epistemic value. By contrast, TBM does not readily account for these representations' epistemic value. Hence, only ITM accords with these aspects of scientific practice.

6.5.2 *Idealizations*

Critics frequently point to idealizations as evidence against TBM. In short, idealizations appear to be epistemically valuable falsehoods, and this is thought to be incompatible with TBM. Once again, TBM's basic and componential strategies are unpromising, and its instrumental strategy succumbs to ITM's axiological advantage. Begin with a shopworn example. The ideal gas law is:

$$pV_m = RT$$

Here, p , V_m , and T denote a gas' pressure, molar volume, and temperature, respectively, and R is the ideal gas constant. In some statistical-mechanical derivations of this law, particles in a gas are assumed not to interact.¹² Though false, this assumption appears to advance our understanding of gases.

Such understanding is epistemically valuable, yet TBM does not readily accommodate it. Quite clearly, the basic TBM strategy will not work, because the proposition *that particles in an ideal gas do not interact* is false and (consequently) acceptance rather than belief appears to be a more appropriate attitude toward such a proposition (Elgin 2017, Doyle et al. [forthcoming](#)). Of course, this also means that true beliefs are not components of the idealization (or the attitude thereof), so the componential strategy also fails.

TBM's instrumental strategy suggests that idealizations are a means to acquiring true beliefs.¹³ For example, assuming non-interacting particles makes the ideal gas law's underlying statistical mechanics more salient. As before, this contains a grain of truth that is better articulated by ITM's instrumental strategy, which, when applied to idealizations, recapitulates ITM's axiological advantage. So, for the reasons discussed above, idealizations are better regarded as a means to answering relevant questions than populating scientists' heads with true beliefs.

¹²NB: Some authors claim that the ideal gas law assumes that particles do not interact. That is imprecise at best and incorrect at worst. The ideal gas law is a macroscopic law and thereby is altogether silent about whether gases are composed of particles. Rather, statistical-mechanical models from which the ideal gas law can be derived make assumptions about particles (and their interactions). Some of these models assume that particles interact; others do not. See Doyle et al. ([forthcoming](#)) for a discussion.

¹³Doyle et al. ([forthcoming](#)) argue this point.

Additionally, true-belief monists who assign mere instrumental epistemic value to idealizations must address two crucial issues that ITM ably resolves. First, are idealizations epistemically benign, i.e., of *no* epistemic value, or are they epistemically harmful, i.e., of *negative* epistemic value owing to their falsehood? Second, if idealizations are epistemically harmful, then what kind of principled “axiological book-keeping” assures true-belief monists that idealizations’ positive epistemic value outweighs their negative epistemic value?¹⁴

Shifting from TBM to ITM fills these gaps. Begin by distinguishing epistemically benign and epistemically harmful falsehoods. Our view suggests that epistemically benign falsehoods are false answers to *irrelevant* questions. This does justice to the assumption of non-interacting particles in deriving the ideal gas law. Consider the central question in this example—why does the ideal gas law hold? As several authors note, whether particles interact is no part of the answer to this question (Doyle et al. [forthcoming](#); Strevens 2008; Khalifa 2017; Sullivan and Khalifa 2019). Rather, the partition function—which is true—does the lion’s share of the work.¹⁵ So, in many contexts in which this why-question is relevant, an *irrelevant question* would be, “Do particles in an ideal gas interact?”. Thus, the assumption of non-interacting particles is epistemically benign because the only false answers it yields are to irrelevant questions such as this one.

We can contrast this with epistemically harmful falsehoods, which have negative epistemic value because they are false answers to *relevant* questions. Continuing with our example, a false answer to the question of why the ideal gas law obtains, for instance, would be epistemically harmful. Indeed, cases in which questions about particle interactions become relevant are readily available. For instance, a slightly more sophisticated equation of state than the ideal gas law is the van der Waals equation:

$$(p + a / V_m^2)(V_m - b) = RT$$

Here, a and b represent intermolecular attraction and molecular volume, respectively. Importantly, $a \neq 0$. Thus, whereas a false answer to the question, “Do particles in this gas interact?” makes no difference to answering why the ideal gas law obtains, the same cannot be said when answering why the van der Waals equation holds. In short, the latter question erotetically implies the question about particle interactions. Thus, in the case of the van der Waals equation, the falsehood *that particles do not interact* is epistemically harmful.

¹⁴NB: Some deny that idealizations have *any* epistemic value, but are replete with *non-epistemic* benefits, such as easier calculation (e.g., Sullivan & Khalifa 2019). Such views face similar challenges, for they may need to keep axiological books on whether idealizations’ positive *non-epistemic* value eclipses their negative epistemic value. Our arguments against TBM’s instrumental strategy apply, with minor revision, to these positions.

¹⁵A staple of statistical mechanics, the partition function Z is given by a sum over all states of the system in terms of the energy E of each state: $Z = \sum e^{-E/kT}$.

We have seen that ITM fruitfully distinguishes between epistemically benign and epistemically harmful falsehoods. It thereby obviates any “axiological book-keeping”. Since the idealization involved in the ideal gas law is epistemically benign, whatever positive value it possesses can shine through at no epistemic cost. Moreover, this once again rests on which questions are relevant. Hence, it provides another advertisement for ITM’s perspectivism.

Could TBM pull off an analogous move? On such a view, epistemically benign falsehoods are not believed (but are perhaps accepted), while epistemically harmful falsehoods are believed. However, this TBM proposal looks deeply flawed. Consider two scenarios that are identical, save for the following:

False Belief: Jack believes a false answer to a relevant question, say that little demons’ machinations are why the ideal gas law obtains.

False Acceptance: Jack accepts, but does not believe, the same false answer to the same relevant question.

If this TBM proposal is correct, then *False Belief* is epistemically harmful but *False Acceptance* is benign. However, this just seems wrong. By contrast, ITM delivers the more plausible verdict: both situations are epistemically harmful, as both provide false answers to relevant questions. Furthermore, because they cannot satisfactorily distinguish between epistemically benign and epistemically harmful falsehoods, true-belief monists must still balance their axiological books.

To summarize, we have argued that TBM’s advocates are right to think that idealizations are of mere instrumental epistemic value, but are wrong to think that true beliefs ground this epistemic value. Any account that takes idealizations to be of instrumental epistemic value must distinguish between epistemically benign and epistemically harmful falsehoods. Our way of funding this distinction outdoes TBM’s. Hence, idealizations are more profitably understood as an effective means to answering relevant questions—as determined by inquirers’ perspectives.

6.5.3 *Approximations*

Idealizations vividly illustrate TBM’s poor fit with one of model-based science’s representational tropes. Might TBM fare better with more mundane tropes of these kinds? Specifically, idealizations are deliberate distortions, but even the most accurate scientific representations are approximations. As we shall now show, ITM better explains approximations’ epistemic value.

In approximations, something is close to the truth, but not perfectly accurate. For example, in using the ideal gas law, scientists appear to answer questions such as:

Q1. How much will doubling pressure affect temperature?

Their answer is:

A1. Doubling pressure will double temperature.

Precisely because the ideal gas law does not countenance particle interactions, this answer is only *approximately* true. However, all such approximations are, *strictly speaking*, false. Furthermore, because A1 is false, approximations would appear to pose problems for both TBM and ITM. Indeed, for reasons analogous to those discussed with idealizations, no simple application of the basic and componential TBM/ITM strategies will work, since there simply are no truths expressed by approximations. Nevertheless, the basic ITM strategy is not doomed. By highlighting the role that background assumptions play in determining speakers' questions (and hence the range of possible answers), we can recover true answers from strictly false statements. For instance, scientists know that the ideal gas law is an approximation that only works at low pressure and high temperature. These standards of approximation are part of the implicit common knowledge operative in most scientific contexts. Thus, competent and informed audiences will interpret Q1 as shorthand for the following, more explicit question:

Q2. At low density and high temperature, how much will doubling pressure affect temperature *within an acceptable margin for error* (ϵ)?

Similarly, such audiences will interpret A1 as expressing:

A2. At low density and high temperature, doubling pressure will double temperature *within an acceptable margin for error* (ϵ).

Crucially, A2 is not merely approximately true, but strictly true. Thus, whether a putative approximation is epistemically valuable depends on the phenomena being studied and the purposes to which it is being requisitioned. Questions about the phenomena nicely capture these dimensions of approximation, and can thereby do justice to approximations' shifting fortunes regarding epistemic value.

By contrast, TBM has no such mechanism. To see this, note that both the ideal gas law and the van der Waals equation can be regarded as approximations of the state of affairs more accurately represented by the virial equation of state:

$$\frac{pV_m}{RT} = 1 + \frac{B}{V_m} + \frac{C}{V_m^2} + \frac{D}{V_m^3} + \dots$$

This expansion is rendered arbitrarily precise by extending the equation indefinitely, with each added term being derivable from increasingly detailed and accurate assumptions about the intermolecular forces. For instance, B corresponds to interactions between pairs of molecules; C , triplets; D , quartets; etc. Every non-virial equation of state, such as the ideal gas law and the van der Waals equation, is approximately true under different boundary conditions, and is, strictly speaking, false.

TBM may attempt to accommodate these and other approximations by mimicking our strategy. Such mimicry would distinguish between: (a) the true claim that *approximately*, p and (b) the false but approximately true claim that p . Since it builds the approximation into the content of the proposition, so to speak, the former is true and not merely approximately so. Hence, just as ITM would allow (a) to serve as an answer, TBM would allow it to serve as a belief. In this example,

$pV_m = RT$ is false, but a nearby claim is true, and not merely approximately so. Perhaps what is believed is the truth that, *at low pressure and high temperature*, $pV_m \approx RT$ (Mizrahi 2012). This suffices as far as it goes, but, once again, ITM explains approximations' epistemic value better than TBM.

For instance, the ideal gas law (or van der Waals equation, for that matter) is simply not epistemically valuable when it comes to the purposes that other equations of state serve. Consider the stiffened equation of state,¹⁶ which has many applications, e.g., modeling underwater nuclear explosions. Additionally, it has practical applications such as sonic shock lithotripsy—a treatment for kidney stones and other ailments. Since all equations of state are approximations of the virial expansion, a TBM strategy that simply swapped out “=” for “ \approx ” fails to explain why the ideal gas law is not epistemically valuable in modeling these phenomena. By contrast, ITM has no such problem: only the stiffened equation of state correctly answers questions about underwater nukes, kidney stones, and other delights.

Moreover, this case is not isolated. Dozens of equations of state exist, and figure in the modeling of explosives, seawater salinity, stars, the products of particle interactions, oilfield reservoirs, and so on. Each phenomenon is the object of a distinct line of inquiry with its own set of questions and concomitant background assumptions. Thus, ITM is superior to TBM in accounting for why different approximations are epistemically valuable in different circumstances, and precisely because of its perspectivism. Additionally, and as before, equations of state earn their keep by being answers to questions, and how they are implemented in scientists' minds is secondary—yet another manifestation of ITM's axiological advantage.

However, perhaps TBM's instrumental strategy provides a reprieve. This would mean that, e.g., accepting the ideal gas law is valuable simply because it is a means to achieving a true belief. This will also succumb to the axiological advantage, but even if we bracket that point, there is a further question: to which truths are equations of state a means? As we see it, the two most plausible options fail to redeem TBM.

The first option is that non-virial equations of state are each a means to the virial expansion; to use Elgin's (2007, 41) apt turn of phrase, they're mere “way stations” to something more accurate. However, this gets scientific practice backwards: much of scientific discovery in this area uses the virial expansion to discover new equations of state that model more specific phenomena. The ideal gas law's historical peculiarity and simplicity obscure this fact. By contrast, the stiffened equation of state is more representative: it was discovered by conjoining the virial expansion with assumptions about highly pressurized water's physical properties and then performing the appropriate derivations. Thus, the stiffened equation of state is not plausibly regarded as a means to discovering the virial expansion, since this gets the order of discovery and derivation backwards. Indeed, this suggests that the virial expansion is a means to answering questions about the stiffened equation of state (though not merely so).

¹⁶The stiffened equation of state is: $p = \rho(\gamma - 1)e - \gamma p^0$. Here, ρ is the water's density, e is the internal energy per unit mass, γ is an empirically determined constant (≈ 6.1), and p^0 is another constant, representing the attraction between water molecules.

On the second way of glossing TBM's instrumental strategy, the ideal gas law is a means to acquiring true beliefs about changes in particular gases' pressure, volume, temperature, etc. for gases at low pressure and high temperature. For this to work, the propositions about changes in a gas' properties would have to be true, and could not be mere approximations. Otherwise, they simply reignite the fires they were supposed to extinguish. However, this is implausible. If pressure *approximately* increases by a given magnitude, then one cannot infer that temperature increases *exactly* by a proportional magnitude. Of course, true-belief monists could avoid this result by hedging these claims using " \approx " instead of " $=$ ", but we have already rehearsed ITM's advantages on this front.

Thus, like idealizations, ITM surpasses TBM against the problems posed by scientists' ample use of approximations. Specifically, it more precisely indicates when a particular approximation is epistemically valuable. Unlike our previous discussions, however, approximations are not of mere instrumental epistemic value; they can serve as goals of inquiry unto themselves. This is as it should be: many answers to scientific questions traffic in approximations.

6.6 Perspectivism Defended

Summarizing, inquisitive truth monism surpasses true-belief monism in better characterizing both scientific inquiry's goals and non-propositional representations, idealizations, and approximations' epistemic value. In making our case, we have let interests, social roles, and background assumptions (whether true or false) determine inquirers' perspectives. Perspectives, in turn, determine which questions are relevant to inquirers and answers to those questions are the locus of fundamental epistemic value. All of inquisitive truth monism's strengths rely on its distinction between relevant and irrelevant questions and thereby rely on its perspectivism.

Of course, with perspectives as our prime movers, some natural worries arise. Intuitively, perspectives based on epistemically bankrupt "perspectival factors" i.e., interests, social roles, and background assumptions, accrue less epistemic value than the scientific perspectives described above. Such an objection takes several forms, none of which undercut ITM.

First, such objections might saddle ITM with the commitment that an answer must cohere with a perspective in order to be correct. This is clearly mistaken, for ITM accords no epistemic value to *false* answers. Furthermore, Sect. 6.5.2 suggests that ITM ought to accord negative epistemic value—epistemic harm—to false answers to relevant questions. Importantly, we do not assume any exotic perspectival theory of truth—the T-schema does just fine. Hence, although new age claptrap, lies, and mistaken claims are put forward as answers to relevant questions from particular perspectives, those answers lack epistemic value. Similarly, we assume that x is a means to y only if x causes or raises the objective probability of y . Since ITM only concerns epistemic value, it need not regard facts about causation and objective probability as perspectival. Thus, like truth, instrumental epistemic value

is not wholly at the mercy of quirky perspectives. As a result, our view accords no epistemic value to false answers or objectively unreliable methods, regardless of their centrality to misguided perspectives.

Alternatively, one may worry that some relevant questions are not worth asking because the background assumptions that support their erotetic implications are false. We see no reason why false background assumptions from which questions are (erotetically) inferred would raise such worries. For instance, Newtonian mechanics was a fruitful theory that, in conjunction with its superquestions, e.g., “How do objects move?” erotetically implied many other questions, e.g., “Why does the perihelion of Mercury precess?”. The latter question’s relevance to Newtonian physicists and their successors is incontrovertible. Furthermore, although such questions were only correctly answered by abandoning Newtonian mechanics in favor of relativistic mechanics, the true answer to this question is clearly epistemically valuable, just as ITM states. Thus, false background assumptions *per se* are no hurdle to relevant questions or epistemic value.

However, this raises a deeper worry. Among these assumptions are the inquirer’s presuppositions, i.e., those statements a speaker commits herself to when asking a question. In erotetic logic, presuppositions are any statement entailed by each answer to a question. For instance, if someone asks, “Who drank all the whiskey?”, she presupposes that someone drank all the whiskey. This presupposition is part of the background assumptions that inform the speaker’s perspective, which, in turn determines what questions are relevant for her.

In the Newtonian example, some background assumptions but no presuppositions were false. But a more pressing objection arises when questions’ presuppositions are false, for by ITM’s own standards, such questions admit of no true answer. This seems to provide compelling grounds for claiming that questions with false presuppositions cannot be relevant. We disagree, for there are two kinds of answers, corresponding to whether a question has true or false presuppositions.

Thus far, we have focused on the former case, where *direct* answers are apt. Roughly put, a direct answer is a response that provides neither more nor less information than its question demands (Belnap and Steel 1976). For instance, the proposition, *that Jim only went to the movies*, directly answers the question, *Did Jim go to the mall or to the movies?* However, when questions have false presuppositions, true answers will be *corrective*; not direct. Consider, for instance, a case in which two parents are reluctant to vaccinate their children. They ask their pediatrician, how the measles, mumps, rubella (MMR) vaccine causes autism in children. The pediatrician replies, “I’m sorry, but you’re mistaken. MMR vaccines don’t cause autism”. Here, she does not provide a direct answer to the parents’ question, but instead corrects it by denying one of its presuppositions. Corrective answers to misguided questions are epistemically valuable, for we learn something true that we did not know before. Importantly, this requires no revision to ITM, as inquirers should always provide a true answer. It simply specifies that some of these answers are direct and others corrective.

Finally, one may worry that our perspectivism conflates epistemic with non-epistemic value. Throughout we have assumed that a truth’s ability to answer a rel-

evant question is of *epistemic* value. However, our perspectival factors are intuitively of non-epistemic value. Perhaps, then, a truth's ability to answer a relevant question is of *non-epistemic* value. On this view, truths that fail to answer relevant questions are epistemically valuable, and any negative valence we associate with them is merely because of their lack of non-epistemic (practical, aesthetic, etc.) value.

Notice that by assuming our perspectival factors are of non-epistemic value, this objection raises precisely the metaepistemological worries mentioned in Sect. 6.3: what theory-neutral evidence underwrites this intuition? However, even if we bracket this for the sake of argument, it does not follow that the ability to answer a relevant question is of non-epistemic value. Consider: the fact that *a* has property *F* and that *a* also determines *b* does not entail that *b* is *F*. For instance, the fact that one's parents are born in Egypt and that one's parents determine whether or not one was born does not entail that one was born in Egypt. By parity of reasoning, even if our perspectival factors are of non-epistemic value and determine whether a truth answers a relevant question, it does not follow that a truth's ability to answer relevant questions is of non-epistemic value.

Thus, all told, ITM's hearty embrace of perspectivism is defensible. It requires *true* answers to relevant questions to underwrite epistemic value, and requires no exotic perspectivism about truth, causation, or probability. Its allowance of false background assumptions, including false presuppositions, to yield relevant questions seems to be a feature rather than a bug, for such questions can be engines of good inquiry, either because they erotetically imply questions with true presuppositions (as in the case of Newtonian mechanics and Mercury's perihelion) or because they lead to corrective answers that reveal where past inquiries have gone awry. Finally, we have not covertly changed the subject from epistemic value to non-epistemic value.

6.7 Conclusion

To conclude, we have argued that inquisitive truth monism—the claim that only true answers to relevant questions are of fundamental epistemic value—outperforms the more venerable true-belief monism. By exhibiting greater fidelity to the Intuition About Inquiry, our view more readily accounts for the non-propositional and inter-subjective dimensions of scientific representation, as well as idealization and approximation's epistemic value. Furthermore, since questions' relevance is a function of inquirers' interests, social roles, and background assumptions, our view entails that epistemic value is inherently perspectival.

Moreover, ITM suggests several exciting lines of development. Most obviously, we would like to argue that being a true answer to a relevant question is not just necessary but also sufficient for being epistemically valuable. Additionally, we have only compared ITM to TBM. However, favorable comparisons with epistemic value pluralists and monists of different persuasions would cement ITM's plausibility.

Similarly, our perspectivism invites comparisons with other prominent perspectivist positions in the philosophy of science (e.g., Massimi 2018).

Finally, our view raises questions about how different social arrangements might yield different allotments of epistemic value. Are people in certain social roles not entitled to ask or answer questions that would be epistemically valuable to them, given their broader interests? Might they sometimes be forced to answer questions that, while epistemically valuable to their audiences, are morally harmful to them? In this way, we see perspectivism about epistemic value as promoting a commitment to interrogate—and hopefully prevent—various kinds of epistemic injustice.

Acknowledgments We would like to thank Michela Massimi, Suilin Lavelle, Kate Nolfi, and the audience at the Edinburgh conference, *Knowledge from a Human Point of View*, for their feedback on earlier drafts.

Bibliography

- Ahlstrom-Vij, K., & Grimm, S. R. (2013). Getting it right. *Philosophical Studies*, 166(2), 329–347.
- Ahlstrom-Vij, K. (2013). In defense of Veritistic value monism. *Pacific Philosophical Quarterly*, 94(1), 19–40.
- Belnap, N., & Steel, B. (1976). *The logic of questions and answers*. New Haven: Yale University Press.
- Berker, S. (2013). Epistemic teleology and the separateness of propositions. *Philosophical Review*, 122(3), 337–393.
- Bird, A. (2010). Social knowing: The social sense of ‘scientific knowledge’. *Philosophical Perspectives*, 24(1), 23–56.
- Buchak, L. (2014). Belief, credence, and norms. *Philosophical Studies*, 169(2), 1–27.
- Cohen, J. (1992). *An essay on belief and acceptance*. Oxford: Clarendon Press.
- David, M. (2001). Truth as the epistemic goal. In M. Steup (Ed.), *Knowledge, truth, and duty* (pp. 151–169). New York: Oxford University Press.
- Doyle, Y., Egan, S., Graham, N., & Khalifa, K. (forthcoming). Non-factive understanding: A statement and defense. *Journal for General Philosophy of Science*. <https://doi.org/10.1007/s10838-019-09469-3>
- Elgin, C. (2007). Understanding and the facts. *Philosophical Studies*, 132(1), 33–42.
- Elgin, C. (2017). *True enough*. Cambridge: MIT Press.
- Giere, R. N. (2006). *Scientific perspectivism*. Chicago: University of Chicago Press.
- Goldman, A. I. (1999). *Knowledge in a social world*. Oxford: Oxford University Press.
- Groenendijk, J., & Stokhof, M. (1984). *Studies on the semantics of questions and the pragmatics of answers*. Dissertation. University of Amsterdam.
- Hamblin, C. L. (1958). Questions. *Australasian Journal of Philosophy*, 36(3), 159–168.
- Hart, H. L. A. (1968). *Punishment and responsibility: Essays in the philosophy of law*. Oxford: Oxford University Press.
- Hieronymi, P. (2008). Responsibility for believing. *Synthese*, 161(3), 357–373.
- Khalifa, K. (2017). *Understanding, explanation, and scientific knowledge*. Cambridge: Cambridge University Press.
- Kukla, R. (2015). Delimiting the proper scope of epistemology. *Philosophical Perspectives*, 29(1), 202–216.
- Lynch, M. P. (2004). *True to life: Why truth matters*. Cambridge: MIT Press.
- Magnus, P. D. (2013). What scientists know is not a function of what scientists know. *Philosophy of Science*, 80(5), 840–849.

- Massimi, M. (2018). Four kinds of perspectival truth. *Philosophy and Phenomenological Research*, 96(2), 342–359.
- Merton, R. K. (1942/1973). The normative structure of science. In *The sociology of science: Theoretical and empirical investigations* (pp. 267–278). Chicago: University of Chicago Press.
- Millson, J. (2014). Queries and assertions in minimally discursive practice. In Rodger Kibble et al. (eds.), *Proceedings of the society for the study of artificial intelligence and the simulation of behavior, AISB'50*. Goldsmiths College, UK.
- Millson, J. (2019). A cut-free sequent calculus for defeasible erotetic inferences. *Studia Logica*. <https://doi.org/10.1007/s11225-018-9839-z>.
- Millson, J. & Khalifa, K. (in press). Explanatory obligations. *Episteme*.
- Mizrahi, M. (2012). Idealizations and scientific understanding. *Philosophical Studies*, 160(2), 237–252.
- Olsson, E. J. (2007). Reliabilism, stability, and the value of knowledge. *American Philosophical Quarterly*, 44(4), 343–355.
- Pedersen, N. J. L. L. (2017). Pure epistemic pluralism. In A. Coliva & N. J. L. L. Pedersen (Eds.), *Epistemic pluralism* (pp. 47–92). Cham: Springer.
- Pritchard, D., Turri, J. & Carter, J. A. (2018). *The value of knowledge*. The Stanford Encyclopedia of Philosophy. <https://plato.stanford.edu/archives/spr2018/entries/knowledge-value>.
- Sosa, E. (2003). The place of truth in epistemology. In L. Zagzebski & M. DePaul (Eds.), *Intellectual virtue: Perspectives from ethics and epistemology* (pp. 155–180). New York: Oxford University Press.
- Strevens, M. (2008). *Depth: An account of scientific explanation*. Cambridge: Harvard University Press.
- Suárez, M. (2002). An inferential conception of scientific representation. *Philosophy of Science*, 71(5), 767–779.
- Suárez, M. (2012). The ample modelling mind. *Studies in History and Philosophy of Science Part A*, 43(1), 213–217.
- Sullivan, E. & Khalifa, K. (2019). Idealizations and understanding: Much ado about nothing? *Australasian Journal of Philosophy*. <https://doi.org/10.1080/00048402.2018.156433>.
- van Fraassen, B. C. (2008). *Scientific representation: Paradoxes of perspective*. Oxford: Oxford University Press.
- Weisberg, M. (2013). *Simulation and similarity: Using models to understand the world*. Oxford: Oxford University Press.
- Wiśniewski, A. (1995). *The posing of questions: Logical foundations of erotetic inferences*. New York: Springer.
- Wiśniewski, A. (2013). *Questions, inferences, and scenarios*. London: College Publications.
- Wray, K. B. (2001). Collective belief and acceptance. *Synthese*, 129(3), 319–333.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

