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Characterizing the Value-Free Ideal: From a Dichotomy to a Multiplicity[1]

Kevin C. Elliott

1. Introduction

The value-free ideal (VFI) for science has been an important topic of debate for hundreds of years (Proctor 1991), and it has played a particularly significant role in the recent philosophical literature on "values and science." Heather Douglas, whose critique of the VFI has been foundational for this recent philosophical literature, defines the VFI as the view that "the value judgments internal to science, involving the evaluation and acceptance of scientific results at the heart of the research process, are to be as free as humanly possible of all social and ethical values" (2009, 45). At this point, the dominant position among philosophers of science is that the VFI should be rejected (Brown under review; Douglas and Branch 2024; Parker 2024). By adopting this conclusion, scholars have opened up a range of important questions about how to manage the influences of values in science and how to distinguish appropriate roles for values from inappropriate roles (e.g., Holman and Wilholt 2022).

Despite the centrality of the VFI for the literature on values and science, I argue in this chapter that it has not been adequately scrutinized. Although most introductions to the field have formulated it in roughly the same way that Douglas did (see e.g., Biddle 2013; Brown 2020; Elliott 2017; Elliott 2022), there are other plausible ways that one might characterize it (see e.g., de Melo-Martín and Intemann 2016; Menon and Stegenga 2023; Stegenga and Menon 2023).[2] For example, as I will emphasize below, Douglas's characterization of the VFI focuses on excluding values from a particular group of scientific activities (namely, the "internal"

[1] It is particularly fitting that I am writing this chapter for a book dedicated to Matt Brown because he started me down the path of thinking that it might be fruitful to distinguish different characterizations of the VFI. Matt participated in a workshop that I co-organized on "Cognitive Attitudes and Values in Science" at the University of Notre Dame in 2013. At the workshop, he pointed out that it wasn't clear whether I was truly abandoning the VFI, given my inclination to limit the influences of social and ethical values to the cognitive attitude of acceptance rather than belief. (See Section 3 of this chapter for further discussion about cognitive attitudes and the VFI.) After reflecting on his question, I concluded that I was in fact abandoning the VFI because I regarded science as a pragmatic enterprise in which scientists are virtually always engaged in accepting claims for the purposes of guiding action, and therefore I regarded social and ethical values as being relevant to the central activities of scientific reasoning. Nevertheless, his questioning helped me to realize that I might be rejecting one characterization of the VFI while holding onto other characterizations of it. This chapter is my attempt to flesh out my long-running thoughts about different ways of formulating the VFI.

[2] One might argue that there is no need to consider multiple characterizations of the VFI because (at least as Douglas envisioned it) contemporary accounts of the VFI are intended to state the specific view that a group of prominent thinkers held about science during a particular historical period (namely, the 1950s and 1960s). Thus, even if one could, in principle, formulate the VFI in different ways, the only formulation that matters is the one propounded by these influential figures during the mid-twentieth century. There are multiple problems with this argument, however. First, not everyone held the same views about the proper roles for values in science even during the mid-twentieth century. For example, as mentioned later in this paper, some figures held different views than others about the roles that ethical and social values should play in the context of discovery (see e.g., Polanyi 1962). Second, even if Douglas intended to focus on a particular historical characterization of the VFI, others are clearly not committed to interpreting the VFI in that particular way (see e.g., de Melo-Martín and Intemann 2016; Menon and Stegenga 2023); thus, it is important to consider the full variety of ways in which the VFI can be interpreted.

judgments involved in evaluating and accepting scientific results), but one could characterize the VFI in a more or less stringent manner depending on which aspects of science one thought should be preserved as free from value influences. Those who aimed to be more stringent could propose a version of the VFI that excludes values not only from evaluating and interpreting scientific results but also from activities like developing study designs and research questions (see e.g., Polanyi 1962).[3] Those who aimed to be less stringent could propose a version of the VFI that excludes values not from all aspects of scientific reasoning but only from specific aspects, such as assessing the amount of evidence in favor of theories or hypotheses.

I focus on the three central concepts associated with the VFI in order to construct a three-part framework for organizing different ways that it can be characterized. In other words, I suggest that one can arrive at different characterizations of the value-free ideal depending on how one interprets *values*, what one means by *freedom* from value influences, and what kind of an *ideal* one is putting forward. On the basis of this analysis, I conclude that it would be better to formulate the VFI not in terms of a single characterization but rather in terms of a multiplicity of distinct but related characterizations. This conclusion has significant implications for the literature on values and science because it shifts the focus from asking a relatively simple yes/no question ("Should the VFI be rejected?") to asking much more complex questions (e.g., "What form of the VFI should be rejected?" or "How should values influence science, and how should they not influence science?").

This shift in focus has at least two significant benefits. First, it softens the opposition that has developed between proponents and opponents of the VFI. Rather than generating two "camps" with opposing positions, this shift draws attention to a more diverse array of positions that one might accept or reject. By considering all these potential positions, both the critics and the defenders of the VFI might develop more nuanced views and soften their opposition. Second, this shift in focus can potentially help to broaden research on the topic of values and science. When everyone works with a single characterization of the VFI, it tends to focus scholarly attention on the specific ways in which that particular characterization prohibits and allows values to influence science. Working with multiple different characterizations can help draw attention to a broader array of research questions and different ways of thinking about the relationships between values and science.

Building on these points, one of the take-home lessons of this chapter is that those studying the topic of values and science would do well to reflect more deeply on when it does or does not make sense to use the VFI as their central framing topic or principle. There are likely to be some contexts in which it is helpful to focus on defending or opposing the VFI, but this chapter suggests that there are likely to be other contexts in which it would be more fruitful to adopt a different framing. On the positive side, framing scholarship on values and science in terms of opposition to the VFI has been an important strategy for drawing renewed attention to this area of inquiry and challenging earlier philosophical assumptions about the legitimate roles for values in science (see e.g., Douglas 2009). Also, as long as the VFI is characterized in a multiplicity of different ways, it can serve as a helpful heuristic tool for "mapping" the wide range of relationships between values and scientific practice.[4]

However, up to this point, the VFI has typically been characterized not as a multiplicity of different positions but rather as a single position, and debating the VFI in such a dichotomous

[3] For example, Dan Hicks characterizes the VFI such that it prohibits values not only from influencing hypothesis acceptance but also from influencing the process of "gathering evidence" (2018, 166).

[4] I'm grateful to Mousa Mohammadian for helping me think through this point.

manner has the potential disadvantage of "hardening" people's positions into two opposing views. This is problematic because everyone involved in contemporary debates about values and science accepts some forms of value influence in science while rejecting other forms, so focusing on the VFI can then potentially foster a greater sense of conflict than necessary. In addition, as noted above, when discussions are framed in terms of a particular characterization of the VFI, it places people's attention primarily on the specific ways in which values are forbidden under that characterization. For example, if the VFI forbids values to play a role in the "internal" aspects of scientific reasoning, then efforts to overturn the VFI can inadvertently encourage the notion that it is only those "internal" value influences that are interesting and important. In actuality, however, a great deal of recent scholarship has blurred the boundaries between activities that are "internal" and "external" to science and shown that seemingly "external" influences of values can have a profound impact on scientific reasoning and practice (e.g., Elliott and McKaughan 2009; Holman and Bruner 2017; Okruhlik 1994; Winsberg 2018).

2. Values

According to my three-part framework, the first way in which characterizations of the VFI can vary is by employing different notions of the "values" that are to be excluded. The basic idea of the VFI is that science is supposed to remain free of values or value influences, but one can arrive at different characterizations of the VFI depending on which *categories* or *kinds* of values it excludes. This point is not a new one. In her classic formulation of the VFI, Douglas (2009) noted that it does not exclude all values from scientific reasoning; it excludes ethical and social values but not "epistemic" or "cognitive" ones. Thus, one avenue for challenging that version of the VFI is to deny that it is even possible to distinguish between epistemic and non-epistemic values (see e.g., Longino 1996; Rooney 2017). However, even if one granted the defenders of the VFI that a general distinction could be made between epistemic and non-epistemic values, the precise contours of this distinction would still be subject to debate (see e.g., Douglas 2013; Lacey 2017; Laudan 1984; Rooney 2017). For example, aesthetic values have received relatively little attention in the literature on values and science (although see Currie 2023; Ivanova 2017; Morgan 2013), and it is unclear whether they should be regarded as epistemic or non-epistemic. Faced with these sorts of difficult distinctions between values that straddle the borderline between epistemic and non-epistemic ones (or cognitive and noncognitive ones, or constitutive and contextual ones), it seems most reasonable to acknowledge that one could formulate different characterizations of the VFI depending on which kinds of values it allowed and which kinds it excluded.[5]

Beyond the question of what *categories* of values to exclude, characterizations of the VFI could also vary based on what kinds of things they count as values, i.e., what *concept* of value they employ. Scholars working on the topic of values and science commonly worry that the word

[5] One might respond to the fuzziness of the epistemic/non-epistemic distinction by adopting Daniel Steel's (2010) approach, which defines epistemic values as those that promote the acquisition of true beliefs and non-epistemic values as those that do not. Although this approach creates a clear-cut distinction between epistemic and non-epistemic values, it can leave scientists with uncertainty about which values are genuinely epistemic or non-epistemic in a particular case until they have ultimately determined which beliefs are true or not. (After all, Steel emphasizes that whether or not a value is epistemic can be a contextual matter.) Thus, if the VFI is supposed to be action-guiding for scientists (a point I will discuss later in the paper), Steel's approach may not provide an adequate basis for formulating it.

'value' is used in a wide variety of different ways (e.g., Biddle 2013; Elliott 2022; Ward 2021). For example, according to Miriam Solomon:

> "Value" has been used to include political values, aesthetic preferences, psychological biases, cognitive goals, personal and societal goals, ideologies, and pre-theoretic intuitions. So "value" is, in practice, not restricted to ethical values or even aesthetic values. "Values" include pre-theoretic assumptions, ethical conduct of inquiry, and causes of preference for one theory over another. (2012, 332-333)

Thus, efforts to distinguish different concepts of values (as well as other related phenomena that might be excluded by the VFI) can potentially generate different characterizations of the VFI (see e.g., Hilligardt 2022; Ward 2021).

Consider, for example, four concepts of values that Rebecca Korf and I recently proposed (Elliott and Korf under review). First, many of those working on the topic of values and science have regarded values as criteria or standards for evaluating scientific theories or other phenomena, such as predictive accuracy, scope, or consistency (e.g., Anderson 1993; Kuhn 1977; Lacey 1999; McMullin 1983). Second, values are sometimes regarded as causal factors that influence scientific decision making, such as heuristics or ideologies or psychological inclinations (e.g., Longino 1990; Solomon 2012; Zhao 2022).[6] Third, values are sometimes treated as beliefs or attitudes about what is desirable, such as ethical beliefs about the importance of environmental sustainability or justice (e.g., Brown 2020; Douglas 2009; Steel 2010). Finally, values can also be regarded as desirable things themselves, such as public health or animal welfare (e.g., Brown 2020; Elliott 2017). Admittedly, the distinctions between these four categories are not entirely sharp. For example, criteria for choice often involve beliefs about what is desirable, and those beliefs or attitudes may serve as causal factors that influence scientific decision making. Nevertheless, although there are likely to be considerable overlaps among these concepts, they do not overlap completely, and so something can serve as a value in one sense without serving as a value in another sense.[7]

These different concepts of values can give rise to different characterizations of the VFI. For example, there are important differences between saying that values *in the sense of causal factors* (or particular types of causal factors, such as non-epistemic ones) should be excluded from scientific reasoning versus saying that values *in the sense of beliefs or attitudes about what is desirable* should be excluded from scientific reasoning. In fact, this difference might shed light on a recent disagreement between Robert Hudson (2021) and Heather Douglas and myself (Douglas and Elliott 2022). Hudson (2021) claimed that those who reject the VFI open the door for scientific reasoning to be corrupted by biases, and he worried that this would exacerbate the lack of reproducibility that afflicts some areas of scientific research. In contrast, Douglas and I (2022) argued that there are important distinctions to be made between biases and values, such that the rejection of the VFI does not mean that biases should be accepted as legitimate elements

[6] As Rebecca Korf and I note in our paper, this definition may be too broad as it stands because there are such a wide array of causal factors that could influence scientists' decision making. One way to limit this concept would be to focus only on *psychological* causal factors and not on other sorts of causal factors. For the purposes of this chapter, though, I think it is best not to prejudge precisely which causal factors should count as values.

[7] It is also worth emphasizing that the nature of the overlaps between these concepts could vary depending on how exactly one interprets them. For example, if one treated criteria for choice and beliefs about what is desirable as causal factors, then our first and third concepts of values would be subsumed as a subset under our second concept of values. However, if one treated criteria for choice and beliefs about what is desirable as reasons, and if one held the metaphysical view that reasons are distinct from causal factors, then our first and third categories of values would not overlap with the second.

of scientific reasoning. Once one begins to consider different concepts of values, it becomes clear that Hudson may be employing a different concept of values from us when he thinks about the VFI. Hudson may be conceptualizing values as causal factors that tend to have a biasing influence on science. (For example, he might characterize a status quo bias that prevents scientists from accepting disruptive theories as a value.) In contrast, Douglas typically conceptualize values as beliefs about what is desirable (e.g., the ethical belief that public health tends to be more important than short-term corporate profits). Thus, Douglas and I would agree with Hudson in accepting a characterization of the VFI that focuses on excluding biases from scientific reasoning (see Douglas and Elliott 2022), but we would insist that this does not justify accepting characterizations of the VFI that exclude values conceptualized in other ways.

Another source of variation when characterizing the VFI is *whose* values should be excluded from scientific reasoning. Douglas's (2009) formulation of the VFI does not specify whose values are at play, but one could characterize the VFI in such a way that that this matters. For example, Inmaculada de Melo-Martín and Kristen Intemann (2016) appear to characterize the VFI as the view that scientists should not allow their *own idiosyncratic* values to influence their reasoning. They imagine a situation in which scientists address value-laden decisions in their research by employing the values of stakeholders rather than the scientists' own personal values. They claim that such an approach would not violate the VFI: "This seems perfectly consistent with the claim made by proponents of the VFI that scientists, qua scientists, ought to refrain from allowing their personal value judgments to influence their decision making" (2016, 513). This interpretation of the VFI seems importantly different from the way Douglas (2009) conceives of it, insofar as Douglas characterizes the VFI as the view that scientists should refrain from allowing *any* social or ethical values from influencing their reasoning, not merely that they should block their *personal* social or ethical values. Nevertheless, recent commentators have suggested that Isaac Levi may have thought of the VFI in roughly the same manner as de Melo-Martín and Intemann (see e.g., Boulicault and Schroeder 2021; Staley 2017). Similarly, Marion Boulicault has recently proposed an "idiosyncrasy-free ideal," according to which scientists should not allow their unique individual features to influence their decision making (see Boulicault and Schroeder 2021). Extending these ideas, one could adopt different characterizations of the VFI depending on whose values one excluded from influencing science. For example, one could handle the values of individual scientists, communities of scientists, policy makers, or broad communities of "interested and affected parties" differently.

3. Value Freedom

Turning next to the notion of value *freedom*, it turns out that one can also generate different characterizations of the VFI depending on how one handles this idea. First, one has to specify *what elements* of science are supposed to remain free of values. As noted in the introduction, Douglas's (2009) formulation of the VFI focuses on the "internal" aspects of science, which she specifies as involving the evaluation and acceptance of hypotheses and theories. She acknowledges that even most proponents of the VFI would accept that values can appropriately influence more "external" aspects of science, such as decisions about what projects are undertaken and how scientific findings are applied. Matt Brown (2020) also emphasizes this point. He notes that most proponents of the VFI rely on a rough distinction between the "context of discovery" and the "context of justification," and they formulate the VFI so that it excludes values from the context of justification while allowing values in the context of discovery. (For a

sophisticated contemporary development of an approach along these lines, see Parker 2024.) Nevertheless, one could hold an even stricter interpretation of the VFI that restricts value influences even in the context of discovery; Percy Bridgman and Michael Polanyi may have held something like this view, insofar as they thought the pursuit of "basic" or "pure" scientific research projects ought to be based solely on "internal" considerations about which ideas were most scientifically promising (see Douglas and Branch 2024; Nye 2011; Shaw 2021). Those concerned to prevent values from influencing the context of justification might find this restrictive view to be all the more tempting in light of recent scholarship showing that the influences of values in the context of discovery are likely to bleed over into the context of justification (see e.g., Elliott and McKaughan 2009; Holman and Bruner 2017; Okruhlik 1994; Winsberg 2018). Thus, those who are sympathetic to the VFI might want to develop characterizations of it that limit the influences of values on at least some aspects of study design or question formulation.[8]

Even if one focuses solely on excluding values from the "internal" aspects of scientific reasoning, there is room for different views about precisely which aspects of scientific reasoning should be classified as internal. Menon and Stegenga (2023) recently brought this issue to the fore because they insisted that the VFI should focus only narrowly on excluding values from the activity of *scientific inference* and not on other activities, such as the interpretation of scientific concepts. This is significant because prominent critics of the VFI have sometimes appealed to the value-ladenness of scientific concepts as an argument against the VFI (e.g., Dupré 2007; Elliott 2022). If one characterizes the VFI so that it focuses only on keeping values out of scientific inference, however, the value-ladenness of scientific concepts may not challenge this characterization of the VFI.[9] Once one starts distinguishing different aspects of scientific reasoning, one could argue that even Douglas (2009) maintains a form of the VFI because she insists that the activity of assessing the degree of evidence in favor of a hypothesis or theory should not be influenced by social or ethical values. On her view, values become relevant once that level of evidence has been determined and scientists turn to the question of whether that level of evidence is sufficient to accept the hypothesis or theory. Others would challenge this view and argue that values cannot and should not be excluded from assessing the amount of evidence in favor of a hypothesis or theory (see e.g., Bluhm 2017; Brown 2020). In addition, Stephanie Harvard and Eric Winsberg (2022) have recently emphasized that scholars working on the topic of science and values should pay attention not only to inference but also to representation; thus, their work raises the question of whether values should play a role in various activities involving scientific modeling (see also Intemann 2015). Finally, some scholars working on the topic of values and science suggest that their primary concern is to keep scientists from engaging in wishful thinking, which would involve driving inquiry toward pre-determined conclusions (e.g., Anderson 2004; Brown 2013). Thus, these scholars might develop a

[8] For example, as noted in an earlier footnote, Dan Hicks characterizes the VFI such that it prohibits values not only from influencing hypothesis acceptance but also from influencing the process of "gathering evidence" (2018, 166)—although one should keep in mind that Hicks is an opponent rather than a proponent of the VFI.

[9] One might think that when scientific concepts presuppose or incorporate value judgments, inferences involving those concepts would also sometimes presuppose or incorporate value judgments, and thus those values would make a difference to inference. However, Menon and Stegenga (2023) dispute this conclusion and argue that scientific concepts could presuppose values without making a difference to inference.

characterization of the VFI that excludes values only from influencing elements of science in ways that would pre-determine the results of inquiry in a particular context.[10]

In addition to this variation regarding the *elements of science* that should be kept free of values, characterizations of the VFI can also vary in terms of the *form of value-ladenness* that is meant to be avoided. Zina Ward (2021) has helped to clarify this point because she has identified four different ways in which judgments in science can be value-laden; values can relate to scientific judgments as: (1) motivating reasons; (2) justifying reasons; (3) causes; or (4) effects.[11] It is not entirely clear whether the VFI as presented by Douglas (2009) was designed to prevent values from playing a role as *motivating reasons* for judgments involved in scientific reasoning or whether it was intended to exclude values from being treated as *justifying reasons*. Some of the debates over whether scientists should defer value-laden judgments to policy makers (thereby maintaining the VFI) seem to presuppose that ethical or social values could legitimately serve as *justifying* reasons for these kinds of choices but that they should not serve as *motivating* reasons for scientists (e.g., Betz 2013; Betz 2017; Elliott 2011; Havstad and Brown 2017). One could formulate different characterizations of the VFI depending on which form of value-ladenness one decided to focus on. In principle, one could also develop a characterization of the VFI that focused on preventing the judgments involved in scientific reasoning from generating value-laden *effects*. Given the pervasive way in which different scientific judgments generate differing conclusions and consequences for society, however, one would probably have to abandon this characterization of the VFI as untenable (Elliott 2017; Ratti and Russo 2024).

Finally, characterizations of the VFI can differ depending on which *cognitive attitudes* are supposed to remain free of values. For example, David Willmes and I (2013) have argued that it is important to maintain a distinction between the cognitive attitudes of *belief* and *acceptance*. By employing this distinction, one could maintain a version of the VFI that focuses on keeping scientists' beliefs free of values while at the same time affirming that scientists should allow their values to influence what they accept for various practical purposes (see also Fleisher 2018).[12] Along these lines, Hugh Lacey makes cognitive attitudes central to his views about the proper roles for values in science:

> Cognitive but not social values play essential roles in making the judgment that a theory or hypothesis is impartially held of a set of phenomena. However, social values have proper and ineliminable roles in other aspects of science, for example, when adopting a theory for the sake of giving direction to a research project, or endorsing a theoretically articulated hypothesis for the sake of informing practical action. (Lacey 2017, 15)

Lacey is difficult to categorize straightforwardly as a proponent or an opponent of the VFI if one does not distinguish different characterizations of it. On one hand, he explicitly prohibits

[10] One might think that there is no room for debate about whether values should be excluded from pre-determining the results of inquiry, but Uwe Peters (2020) has argued that allowing values to pre-determine inquiry at the level of the individual scientist could still allow inquiry to advance effectively at a social level. Thus, there would be room for genuine debate about whether or not to defend a characterization of the VFI that focused on excluding values from pre-determining the outcome of a scientist's inquiry.

[11] Observant readers might note that Ward's list of four forms of value-ladenness has similarities to the list that Korf and I developed of four concepts of values. However, these lists should not simply be equated. Korf and I intended to develop concepts of what values *are*, whereas Ward focuses on what values can *do* or how they can *relate* to scientific judgments. Perhaps one could argue that different concepts of values arose in part based on the different relationships that can arise between values and other things, but that is a question that goes beyond the scope of this chapter.

[12] Importantly, Matt Brown (2015) has rejected the belief/acceptance distinction on Deweyian grounds in order to reject this approach to maintaining a form of the VFI.

incorporating ethical and social values from influencing scientific reasoning if that reasoning involves impartially holding theories; this appears to make him a proponent of the VFI. Nevertheless, if one were to treat science as a pragmatic enterprise in which scientists are almost always adopting or endorsing conclusions for the sake of giving direction to research projects or informing practical action, then he would appear to be an opponent of the VFI. Kareem Khalifa and Marina DiMarco (2019) provide another example of appealing to cognitive attitudes in order to clarify roles for values in science; they argue that one can maintain some forms of the VFI while denying that it applies to judgments of the *pursuit worthiness* of scientific hypotheses, theories, or models (see also Shaw 2022).

4. The Notion of "An Ideal"

Characterizations of the VFI can also vary based on different notions of the *ideal* toward which they are aiming. One potential source of variation is the relationship between descriptive and normative elements in the ideal. Given that the very notion of an ideal seems to be inherently normative, it probably does not make sense to interpret the VFI as being solely descriptive. However, this still leaves room for varying positions on whether and how the ideal might include some descriptive elements along with normative ones. For example, one could characterize the VFI in a sociological way, as the claim that scientists typically regard the exclusion of values from their reasoning as a feature of good science. Claims like this would constitute descriptions of individuals' or communities' normative views about science. Or one could characterize the VFI as the view that scientists, when they are operating at their best or doing proper science, do not incorporate values in their reasoning. Lacey (1999) may be thinking along these lines when he structures his book around the claim that "science is value-free." He is clearly not intending his analysis to be merely descriptive; he is interested in the characteristics of "good" or "proper" science. Justin Biddle's account of the VFI (or, as he puts it, the ideal of epistemic purity), has a similar mixture of descriptive and normative elements: "this view maintains that (1) the proper application of scientific methods will, as a matter of fact, always screen out all contextual factors, and (2) scientists ought to apply scientific methods properly, thereby screening out all contextual factors" (Biddle 2013, 125). Even though these sorts of views are an option, however, it is more common for contemporary figures to follow Douglas (2009) in characterizing the VFI as almost entirely normative (namely, the view that values *ought* to be excluded from the core of scientific reasoning).

Menon and Stegenga (2023) have shown that one could also distinguish between viewing the VFI as an ideal *state* that scientists should try to achieve versus regarding it as a *pursuit* that scientists should try to engage in. This distinction is important because Menon and Stegenga contend that the VFI can be a worthy ideal in the sense of a pursuit even if it is not a worthy ideal in the sense of an end state. In other words, they acknowledge that scientists should not (and cannot) actually achieve the end state of keeping their judgments completely free of value influences. Nevertheless, they argue that it is beneficial for scientists to try to minimize the extent to which their conclusions are value-laden, and thus they contend that the VFI is a worthy ideal if it is regarded as a form of pursuit.

One could develop a closely related distinction between characterizations that treat the VFI as a state to be achieved versus characterizations that treat it as a practical guideline for working scientists. (For more on ideals as states vs guidelines, see Philippi 2020). One might initially think that if scientists understood the state that they should be trying to achieve (e.g.,

excluding non-epistemic values from specific aspects of scientific reasoning), they would automatically be able to guide their decision making by pursuing that state. However, this idea might be too simple. For example, as noted in an earlier footnote, it might be difficult for scientists to determine which values are genuinely epistemic vs non-epistemic. Thus, even if one employed the language of "epistemic" vs "non-epistemic" values in a characterization of the VFI designed to specify the state to be achieved, one might need to describe values in more easily and immediately recognizable ways in order to characterize the VFI as a guideline for working scientists.

Finally, de Melo-Martín and Intemann (2016) have pointed out that one needs to clarify the *circumstances* under which the VFI is actually a meaningful ideal. In other words, one must consider whether it applies only under special circumstances or whether it applies under the real-life circumstances in which scientists typically find themselves. De Melo-Martín and Intemann contend that this distinction is important for understanding Douglas's (2009) critique of the VFI. In their view, she is critiquing the VFI only under non-ideal circumstances, and they claim that she would still accept the VFI as a claim that applies to ideal circumstances. They draw this conclusion because Douglas contends that values have less of a role to play as uncertainty decreases and as the evidence for a hypothesis increases (Douglas 2009). Therefore, under conditions of perfect evidence, de Melo-Martín and Intemann conclude that Douglas would actually accept the VFI. They use this observation as a source of motivation for exploring stronger arguments that would challenge characterizations of the VFI that apply even under ideal evidential circumstances.

One could extend de Melo-Martín and Intemann's point by claiming that even under non-ideal circumstances, there might be some conditions under which a VFI holds and other conditions under which it can be overridden. As Lorraine Daston (2022) has recently emphasized, rules do not have to be regarded as exceptionless; one could regard them instead as generalizations or models that admit of exceptions. One might think about ideals in a similar way, as generalizations or models that still have some exceptions (see e.g., Sheykh-Rezaee and Bikaraan-Behesht 2023). In fact, Stegenga and Menon appear to hold this view, insofar as they propound a particular characterization of the VFI while acknowledging that it could legitimately be violated under a narrow range of conditions (typically involving the application of science for decision making; Stegenga and Menon 2023, 438). This notion that the VFI could be a viable ideal even while having exceptions is highly significant because it makes the VFI more difficult to challenge; to reject a VFI of this sort requires not merely showing that it should be violated in some cases but rather showing that it is problematic in a deeper or more systematic fashion.

5. The Upshot

I have argued that it is possible to characterize the VFI in a surprisingly wide variety of ways, and I have organized these different characterizations based on how one interprets *values*, what one means by *freedom* from value influences, and what kind of an *ideal* one is discussing. Table 1 summarizes how variations in the VFI can be organized based on this three-part framework.

Table 1: Different ways of characterizing the VFI, organized in terms of three categories		
Values	Value-freedom	Ideal
• Which kinds of values should be excluded? • What concept of values are we employing (i.e., what are we talking about when we refer to values)? • Whose values should be excluded?	• What elements of science should be kept free of values? • What form of value-ladenness should be prevented? • Which cognitive attitudes should be kept free of values?	• How does the ideal incorporate descriptive vs normative elements? • Does the ideal refer to a state, a pursuit, or a guideline? • Under which circumstances does the ideal hold?

To further clarify how different characterizations of the VFI relate to each other, one could employ visualization techniques like those developed by Palider et al. (2021). As a brief example, Figure 1 illustrates how Douglas's (2009) characterization of the VFI and de Melo-Martín and Intemann's (2016) characterization of the VFI handle three of the nine questions provided in Table 1. The box on the left captures how Douglas's characterization of the VFI answers the questions, the box on the right captures how de Melo-Martín and Intemann's characterization of the VFI answers the questions, and the darker area shared by the two boxes represents the overlap where their characterizations provide the same answers. The three questions provided in the figure were chosen to illustrate three different kinds of relationships that can be represented using these sorts of visualizations. For the first question, the figure demonstrates that neither Douglas nor de Melo-Martín and Intemann are very explicit about the specific concept of values that they are employing. For the second question, the figure shows that both Douglas's characterization of the VFI and de Melo-Martín and Intemann's characterization of the VFI exclude the values of scientists from influencing scientific reasoning. However, as discussed above, Douglas's characterization of the VFI also excludes the values of non-scientists (e.g., stakeholders) from influencing scientific reasoning, whereas de Melo-Martín and Intemann do not appear to think that the VFI excludes such influences. For the third question, the figure shows that Douglas and de Melo-Martín and Intemann appear to answer the question in the same way. Thus, Figure 2 illustrates the heuristic role that diagrams like these could play in clarifying the relationships between different characterizations of the VFI and highlighting issues that merit further clarification.

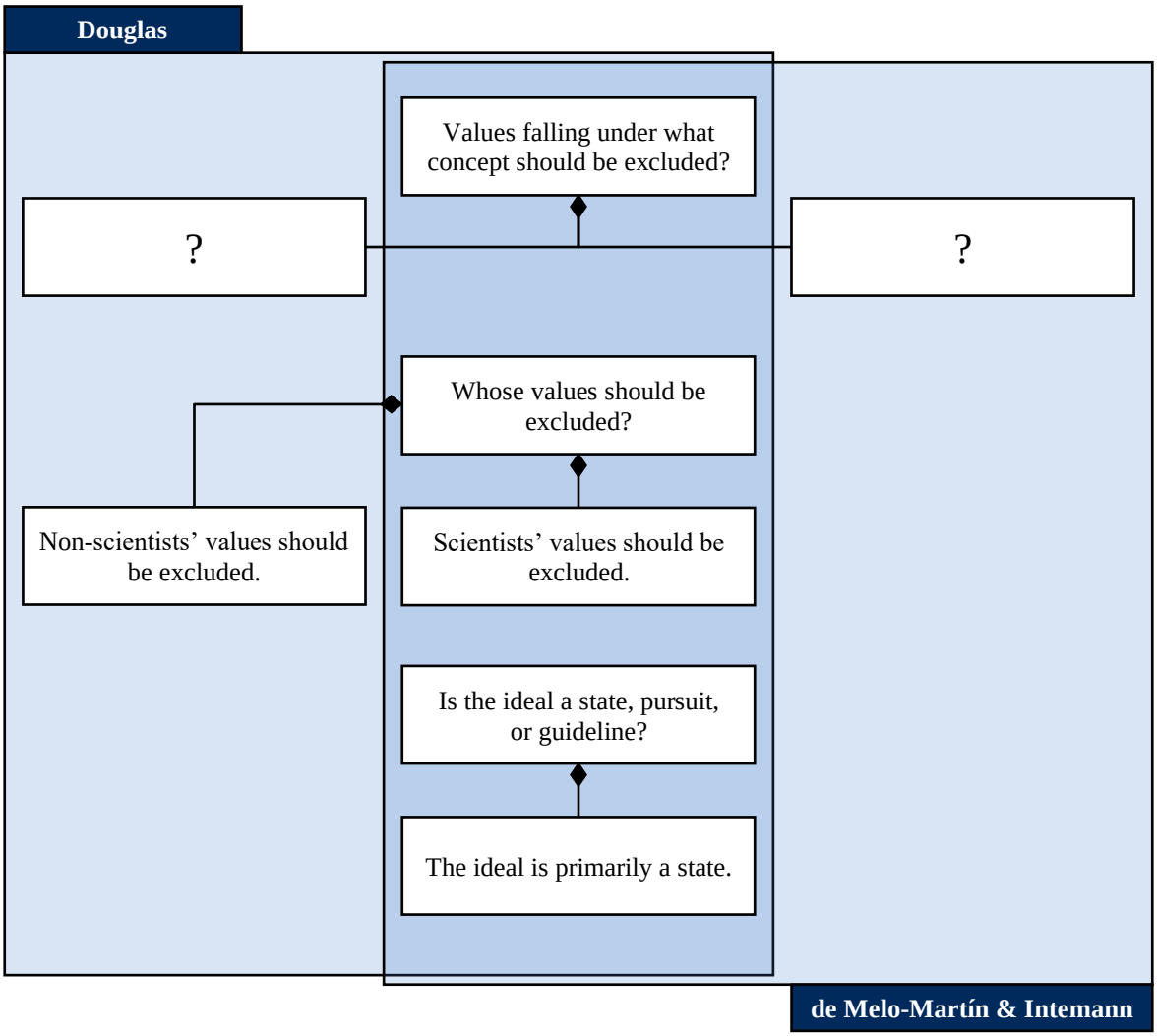

Figure 1. An example of how different characterizations of the VFI could be visualized using the diagraming techniques developed in Palider et al. 2021. The figure compares the characterizations of the VFI provided by Douglas (2009) and de Melo-Martín and Intemann (2016) based on three of the nine questions provided in Table 1.

The remainder of this section highlights two benefits that emerge from distinguishing all these different characterizations of the VFI: (1) it frames the literature on values and science in a more irenic and nuanced fashion; and (2) it suggests promising questions for future investigation. First, consider how attention to different ways of characterizing the VFI could foster a more irenic approach to values and science. At present, discussions about the role of values in science tend to be framed in a dichotomous manner, such that scholars are divided into proponents and opponents of the VFI. There is a tendency to portray the proponents (e.g., Betz 2013; Hudson 2016) as being in a small minority that holds an implausible view while the opponents of the VFI are portrayed as the victors (see e.g., Brown under review; Elliott 2022). Thus, the dichotomous approach to characterizing the VFI encourages a framing of the literature on values and science as an agonistic conflict that needs to be settled or a debate that needs to be won.

Once one recognizes that the VFI can be characterized in different ways, however, it seems more plausible to think in terms of a multiplicity of different positions about the roles that values should play in science. A benefit of this approach is that it shifts the debate from a two-sided battle between the proponents and the opponents of the VFI and frames it as a multi-faceted discussion about possible roles for values in science. For example, even opponents of the "traditional" VFI might find it useful to discuss the possibility of accepting characterizations of the VFI that preclude values from serving as a form of evidence in favor of a theory or hypothesis (see e.g., Bluhm 2017; Brown 2020). They might also want to discuss whether it would be worth trying to exclude scientists' idiosyncratic values as an ideal (see e.g., Boulicault and Schroeder 2021; John 2015; Wilholt 2009). Similarly, even proponents of the "traditional" VFI might want to consider rejecting characterizations of the VFI that exclude values from playing a role in characterizing "mixed" scientific concepts (see Alexandrova 2018 for a discussion of mixed concepts). They might also consider rejecting characterizations of the VFI that exclude values from playing a role in the conclusions that scientists "endorse" when they are asked to provide input for regulatory decision making. Once one recognizes the potential for these debates, it seems somewhat arbitrary to choose a particular characterization of the VFI and to divide everyone into two camps based on those who accept it and those who reject it. Instead, it might be more fruitful to explore the wide variety of positions that one might hold regarding the proper roles for values in science. This approach might soften the seemingly hardened positions of proponents and critics of the VFI.

This leads us to the second benefit of clarifying different ways of characterizing the VFI, namely, that it opens up promising questions for further investigation. One line of questioning is to examine and assess the full range of potential views that one might hold about the legitimate roles for values in science. Some readers might worry that these are essentially the same questions currently being asked under the umbrella of the "new demarcation problem" (see Holman and Wilholt 2022). Thus, it might appear that I am simply re-labeling these existing questions as debates about the VFI rather than debates about the new demarcation problem. Perhaps this is correct, but I would argue that there are potential insights to be gained from recognizing the similarities between these lines of investigation. For example, connecting these lines of inquiry might suggest new questions for those working on the new demarcation problem. Current discussions of the new demarcation problem tend to focus on managing values in the "core" of scientific reasoning, but that focus is inspired by the "traditional" characterization of the VFI found in the work of Douglas (2009). Inspired by the discussion in this chapter, one could turn to new questions about how to demarcate legitimate and illegitimate roles for values in other elements of science that are often regarded to be outside that core (e.g., the design of studies or the formulation of research questions). Connecting these lines of inquiry could also provide inspiration for those working on the VFI; for example, those seeking to canvas the space of possible formulations of the VFI could potentially develop new ideas by considering how those working on the new demarcation problem have characterized inappropriate value influences.

Clarifying different ways of characterizing the VFI can also encourage those working on this topic to scrutinize the full range of ways that values can influence science. Douglas (2009) helpfully drew attention to one specific way in which values can influence science (namely, they can influence scientists' decisions about how much evidence to demand before drawing a conclusion). However, when this is the primary form of value influence used to challenge the VFI, it has the potential to overshadow other forms of value influence in the philosophical

literature. For example, values can also have a profound influence on the shape of scientific knowledge when they steer the details of the research questions that scientists investigate (see e.g., Elliott and McKaughan 2009; Lacey 1999; Okruhlik 1994; Winsberg 2018). However, this avenue for value influences is acceptable even for those who accept the "traditional" VFI, so there is a danger of dismissing it as trivial or philosophically uninteresting if one thinks that the truly significant value influences are those opened up by critiquing the VFI. And as noted previously, there are potential avenues for value influences that some critics of the VFI still seem to regard as illegitimate, such as deciding what counts as evidence in the first place (for discussion of this point, see Bluhm 2017). Even if this line of value influence would still be prohibited even by some prominent critics of the VFI, it is arguably worth examining further. Portraying the VFI in terms of a multiplicity of different views helps to keep all these forms of value influence (both those that are more modest and those that are more ambitious than those promoted by prominent critics of the VFI) on the radar of those studying values and science.

6. An Objection

There is an obvious objection that critics are likely to emphasize in response to the arguments in this chapter. This objection is that even if there are potential variations in how the VFI is characterized, ultimately there is only one main question at stake, and that is the one that Douglas (2009) herself emphasized in her characterization of the VFI.[13] In other words, critics are likely to insist that the only really significant issue is whether non-epistemic values should be excluded from scientific reasoning. Thus, even if there is some potential for creating different formulations of the VFI, none of the variations ultimately matter very much compared to the core question of whether to incorporate non-epistemic values in scientific reasoning.

I have taken steps throughout the chapter to forestall this objection, but it may be helpful to reiterate my response here. The most important element of my response is that it is not clear what counts as "scientific reasoning" for the purposes of the VFI. Thus, there is ample room for disagreement about which of the following activities a proponent of the VFI should be keeping insulated from values: choosing research questions, choosing methodologies, formulating categories and concepts, developing study designs, collecting data, developing models, assessing models, interpreting data, assessing the amount of evidence in support of a hypothesis, determining whether there is sufficient evidence to accept a hypothesis, and deciding how to frame or communicate the outcomes of inquiry. Why should we accept that there is a clean distinction between the activities in this list that are "internal" or "core" to scientific reasoning and those that are not? And once one rejects, or at least problematizes, this internal/external distinction, then it seems relatively clear that the VFI can be formulated in a number of meaningful ways.

Another way to strengthen my position in response to critics is to return to the different cognitive attitudes that scientists can take toward their hypotheses and representations. It is difficult to maintain that there is only one meaningful way of characterizing the VFI when one considers these cognitive attitudes. If my critics insist that there is only one fundamental question at issue in debates about the VFI, which cognitive attitude does this question involve? Is the crucial question whether scientists should prevent non-epistemic values from influencing their beliefs? Or is the question whether they should prevent values from influencing what they accept? Or does this question have to do with what they adopt, endorse, or impartially hold?

[13] I thank Jacob Stegenga for helping me to clarify this objection.

Surely it makes more sense to acknowledge that there is not a single question at issue; there are multiple interesting questions that correspond to these different cognitive attitudes, and reducing them all to a single characterization of the VFI obscures this complexity.

These are only two of the nine forms of variation described in Table 1, but they should be sufficient to show that different characterizations of the VFI are genuinely interesting and are not merely trivial variations on a single question. The other forms of variation in Table 1 add even more richness to the discussion. For example, deciding whose values should be excluded from science raises the question of whether the VFI should be focused on removing *everyone's* values from science or only *individual scientists' idiosyncratic values* (Boulicault and Schroeder 2021). This is a live question that may highlight important differences between Douglas's and Levi's formulations of the VFI. And as discussed above, determining the circumstances under which the VFI holds can also make a significant difference and can influence whether it remains viable or not. If Stegenga and Menon (2023) regard the VFI as the kind of ideal that can be legitimately violated under some conditions, the VFI becomes a more modest notion that is easier to defend than most critics of the VFI have typically thought. Thus, taking all these possibilities into consideration, it seems difficult to argue that they are only minor variations on a single question.

7. Conclusion

I have argued that even though most discussions of the VFI in the recent philosophical literature have employed Douglas's (2009) influential formulation of it, the VFI can actually be characterized in a number of different ways. I have organized this variety of characterizations using a three-part framework that focuses on the values to be excluded, the ways in which science is supposed to be free of those values or their influences, and the nature of the ideal. Thinking about the VFI in terms of a variety of different potential characterizations rather than a single characterization is significant because it shifts discussions of the VFI from the dichotomous question "Should the VFI be rejected?" to more complex questions, like "What form(s) of the VFI should be rejected?" Moreover, I have argued that this shift in focus has at least two potential benefits. First, it has the potential to soften the oppositional framing that has emerged in the literature on science and values. Rather than creating an "in-group" (those who oppose the VFI) and an "out-group" (those who defend the VFI), my proposed shift portrays everyone as holding one among a multiplicity of different views about the appropriate roles for values in science and the ways they should be limited. Softening the oppositional framing might open up the critics and the defenders of the VFI to considering more nuanced positions among this multiplicity. Second, this shift in perspective could potentially help to broaden research on the topic of values and science by focusing scholarly attention on the full range of ways in which values can influence science, including those that are more modest or more ambitious than those emphasized by considering the "traditional" VFI. This chapter should also encourage those working on the topic of values and science to consider the contexts in which the VFI serves as a fruitful way of framing the literature on values and science as well as the contexts in which the VFI is more likely to limit or obscure important issues and discussions.

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