Epistemic Permissivism and Risk Assessment in Irrationality

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Abstract

A popular version of epistemic Permissivism says that, given the total evidence, sometimes there is a permissible credence range towards a proposition. Ginger Schultheis (2018) offers a Dominance Argument against it. Schultheis argues that it is irrational to hold a credence at the edge of any permissible range because the edge credence takes higher risks of being irrational than the credence in the middle. In this paper, I propose two new responses. Firstly, I argue that after the risk assessment in irrationality, a new stable range may emerge such that each credence from it does not take more risks than others. Schultheis's Dominance Argument can only shrink the original credence range to this new stable range. Second, I argue that sometimes it is rational for us to hold a more risky credence when a safer alternative is available. If rationality aims at truth-conduciveness and informativeness, a credence's higher risks of being irrational do not render it irrational when one risks being less truth-conducive in exchange for informativeness.

Keywords: Epistemology, Permissivism, Dominance, Bayesianism

A popular version of epistemic Permissivism says that, given the total evidence, sometimes there is a permissible credence range towards a proposition. Ginger Schultheis (2018) offers a 'Dominance Argument' (hereinafter referred to as DA) against it. The DA claims that it is always irrational to hold a credence at the edge of any permissible range because the edge credence has a higher risk of being irrational than a credence in the middle of the permissible range.

Hawthorne and Isaacs (2021) and Bradley (2021) reply that the DA inappropriately assumes that the agent knows (or is certain) that the middle credence is rational and does not know (or is not certain) that the

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edge credence is rational. Their replies are unconvincing. As I will explain in Section 1, the DA requires only a weaker condition: the edge credence has a higher risk of being irrational than the credence in the middle. I will clarify what Permissivism is committed to and provide a more generous reconstruction of the DA in Section 1.

In this paper, I propose two new responses to the DA.

First, I will argue that even if the edge credence's higher risks of being irrational make it irrational, it does not imply that Permissivism is false, but only that the original credence range is unstable. Such instability is something that permissivists can accept because a new, stable range may emerge from the original credence range, where no credence within this range takes more risks of being irrational than any other credence. The risk assessment of irrationality can only shrink the original permissible range. I will explain my response in section 2. In section 3, I will respond to the objection that a stable range can never emerge.

Second, I will argue that a central premise of the DA is NOT true. This premise says that a credence's having higher risks of being irrational makes it irrational. At the center of my refutation of this premise is the idea that the property of truth-conduciveness does not capture everything we care about in forming credence. We indeed care about rationality because a rational credence is more truth-conducive than an irrational one, and we care about the truth; however, we also care about other properties, such as informativeness. If rationality aims at both truth-conduciveness and informativeness, one can take a risk of being less truth-conducive in exchange for informativeness. I will explain this idea in Section 4.

Section 5 is my conclusion.

1. Reconstructing the DA

A popular version of epistemic Permissivism says that different individuals possessing the same evidence can rationally have different credences in a proposition in some cases (Kelly 2013; Meacham 2019). Schultheis (2018) presents an argument against it. Her argument begins with the following scene: Matt and Abby have the same evidence. For one proposition P, Matt holds a credence of 0.3, and Abby holds a credence of 0.7. Suppose that Permissivism says that all credences toward P within the credence range [0.3, 0.7] are equally rational. Presumably, Matt and Abby cannot *precisely* guess the values of the upper and lower bounds of the permissible credence range, and they can only believe that the permissible credence range runs from roughly 0.3 to roughly 0.7. Schultheis then introduces a crucial premise of her argument, which she calls 'the principle of Weak Rationality Dominance'. Let an *evidential situation* be a complete specification of which credences are rational responses to one's evidence and which are not.

> *Weak Rationality Dominance*: c weakly rationality-dominates c' for S if and only if for every evidential situation that S rationally treats as a live option and in which c' is rational, c is too, and in some evidential situation that S rationally treats as a live option, c is rational, but c' is not. (Schultheis 2018, p.866)

Schultheis says that 0.3 and 0.7 are weakly rationality-dominated by the credence at the middle of the range. Then, Matt and Abby should abandon their former credences. They cannot rationally hold credences at the boundary of the original credence range. If the credences at the range's boundary are not rational, then the initial claim that any credence within the range [0.3, 0.7] is rational contradicts itself. Furthermore, Schultheis argues that for any permissible range, agents cannot rationally hold credence at the edge of the range. This argument concludes that Permissivism is false.

Call any credence sitting at or near the middle of the credence range a *middle credence*. Call any credence sitting in or near the upper or lower boundary of the credence range an *edge credence*. I reconstruct the DA as follows:

P_1 (**Range Requirement**): If Permissivism is true, in some cases, different agents can hold different rational credences in a proposition P, and those credences form a rational credence range [a, b].[1]

P_2 (**Dominance Condition**): For any rational range [a, b], agents are justified in believing that there is a middle credence c that weakly rationality-dominates any edge credence c*.[2]

[1] First, Permissivism has two forms. Intrapersonal Permissivism says that the same individual possessing the same evidence can rationally have different credences in a proposition in some cases, while interpersonal Permissivism says that different individuals possessing the same evidence can rationally have different credences in a proposition in some cases. Schultheis's scenario, which involves two individuals, falls under the scope of Interpersonal Permissivism. I will also focus on this version of Permissivism. Second, Schultheis (2018) says that 'the standard motivations—that there are some general, justifiable rules, and a wide range of starting points—strongly suggest that there will be a wide range of permissible credence in most propositions. If the Permissivists denied this, she owes us a general story about why there can never be such a range' (p.864). Interpersonal Permissivism does not require the commitment to a permissible *range*. It only requires that different individuals hold different rational credences in some cases. Nevertheless, I adopt Schultheis's position that the Range Requirement is plausible for Permissivism *if* no appropriate story is given to deny it.

[2] Hawthorne and Isaacs (2021) and Bradley (2021) hold that the DA's central premises are (i) the agent knows (or is

P_3 (Risk-hedging Requirement): If agents are justified in believing that c weakly rationality dominates c*, it is irrational for them to hold c*.

P_4: For any rational range [a, b], it is irrational for agents to hold any edge credence. (P_2, P_3)

Conclusion: Permissivism is false. (P_1, P_4)

This paper provides two responses to the DA. The first is to reject the Dominance Condition. I will argue that after conducting a risk assessment of irrationality for the original permissible range [a, b], a new, stable range [a', b'] may emerge, where no credence within this range is rationality-dominated by other credences. The second response is to reject the Risk-hedging Requirement. I will argue that if we care about truth and informativeness, holding a risky edge credence is rational. I will explain my first response in sections 2 and 3, and then move to my second response in section 4.

2. The first Response to the DA: rejecting the Dominance Condition

In this section, I will explain why we should reject the Dominance Condition.

The Dominance Condition claims that agents are justified in believing that there is a middle credence c that weakly rationality-dominates edge credence c*. Take the permissible credence range [0.3, 0.7] for example. Suppose that every evidentially possible situation is a sufficiently nearby possible world. The Dominance Condition requires that, from the perspective of agents, for edge credence c* (such as 0.3), there is a middle credence c (such as 0.5) such that (i) for each sufficiently nearby possible world in which c* is rational, c is too, and (ii) there is a sufficiently nearby possible world in which c* is not rational, and c is rational.

For the credence range [0.3, 0.7], how can conditions (i) and (ii) be satisfied at the same time? Schultheis says, 'The evidence is too complex, and his powers of reasoning are nowhere near…good

certain) that the middle credence is rational and does not know (or is not certain) that the edge credence is rational, and (ii) if the agent knows (or is certain) that middle credence is rational and does not know (or is not certain that) the edge credence is irrational, it is irrational for the agent to hold the edge credence. In contrast to them, my reconstruction of the DA only requires a weaker condition, namely, the Dominance Condition. The Dominance Condition asserts that the agent is justified in believing a rationality-dominance relation between middle credence and edge credence, which does not require that the agent knows or is certain that the middle credence is rational. This fits Schultheis's initial motivation of appealing to the Principle of Weak Rationality Dominance. In the toy case, Schultheis sometimes claims that the agent is certain that the middle credence of 0.5 is rational, while not being certain that the edge credence of 0.7 is rational, which arguably entails a rationality-dominance relation between 0.5 and 0.7. I will explain this point in section 2. In section 3, I will also consider some more general situations in which the agent is not certain (or does not know) that the middle credence of 0.5 is rational, yet some form of rationality-dominance relation between certain credences still holds.

[enough for the subject to know the exact boundaries of the permissible range]', and 'If the low boundary is 0.3, then he should believe that it is roughly 0.3—he should believe it is between (say) 0.2 and 0.4. For even though rational requirements are not wholly transparent, they shouldn't be completely opaque to those who reflect carefully' (p.865; brackets added). According to this scenario, the lower boundary in different sufficiently nearby possible worlds is between 0.2 and 0.4. Similarly, the upper bound in different sufficiently nearby possible worlds is between 0.6 and 0.8. We can represent different rational credence ranges in different sufficiently nearby possible worlds in Figure 1. (The world w_0 represents the actual world.)

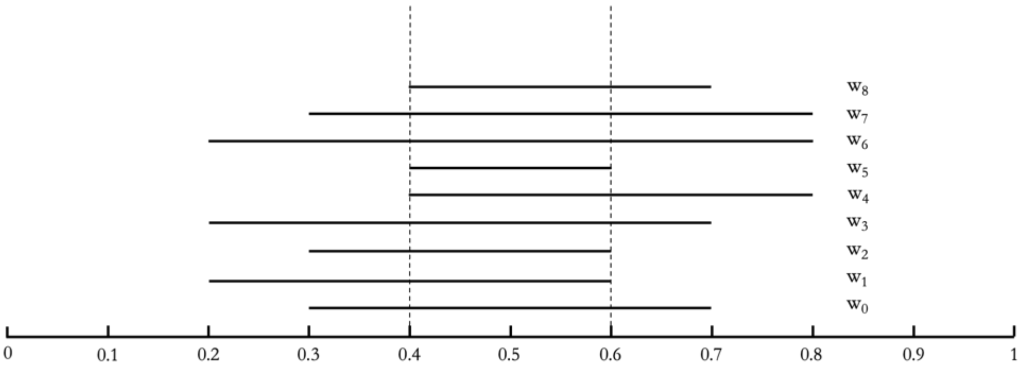

Figure 1: Different Rational Credence Ranges in Different Sufficiently Nearby Possible Worlds

In this way, the agent believes that, for any sufficiently nearby possible world where 0.3 is rational, 0.5 is also, and there is a sufficiently nearby possible world (such as w_5 in Figure 1) in which 0.3 is not rational, and 0.5 is still rational.

Thus, in this case, the Dominance Condition appears to be satisfied. Note, however, that if Figure 1 accurately represents the live options of an agent, then this case is actually *incompatible* with the Dominance Condition. Suppose that an agent has beliefs about the live options illustrated in Figure 1. Then, each credence within the new range [0.4, 0.6] is not rationality-dominated by any other credence, and thus the Dominance Condition is false. The Dominance Condition says that for *any* rational range [a, b], agents are justified in believing that there is a middle credence c that weakly rationality-dominates any edge credence c. But, as we have just seen, no credence in the rational range [0.4, 0.6] is rationality-dominated.

To generalize the discussion, let us define the following concepts.

Stability: A credence is *stable* if and only if no other credence rationality-dominates it. A credence range is *stable* if and only if each credence within this range is stable.

Risk assessment: Risk assessment is the process of considering the rationality-dominance relations between different credences.

New Stable Range Phenomenon: A new stable range emerges after a risk assessment of the original range.

The Dominance Condition fails in cases of New Stable Range Phenomenon. Obviously, the DA would not be a compelling challenge to Permissivism if this New Stable Range Phenomenon could sometimes occur, as a new stable range is consistent with Permissivism—*sometimes*, there is a permissible range in a proposition, given the total evidence. Thus, supporters of the DA must deny that the New Stable Range Phenomenon can happen in *any* case. I will assess this claim in the next section.

3. New Stable Range Phenomenon and Error Estimation

Is it plausible to deny that the New Stable Range Phenomenon could occur in any case? This section presents an argument that suggests that the New Stable Range Phenomenon can happen.

We can interpret the demand of the DA from the perspective of error estimation. Given some total evidence and prior credence range, one gets the original posterior range, such as [0.3, 0.7]. The agent is justified in believing that this original posterior range has some errors. One possible reason is that the agent cannot precisely distinguish between the prior credence of 0.15 and 0.1500001. Another possible reason is that even given a precise prior credence range, there may be some errors while calculating posterior credence when the evidence is complex. These reasons motivate the agent to estimate the errors of the boundaries of the original credence range and consider whether some credences are safer than others. The Dominance Condition says that the outcome of error estimation is that the middle credence is always safer than the edge credence. However, the New Stable Range Phenomenon expresses a situation with more than one safe credence after the error estimation.

Some stories are available to motivate the thought that the New Stable Range Phenomenon can occur. Suppose the original posterior credence range before the error evaluation is [a, b]. Suppose, after error evaluation, the agents learn that the maximal left error of a is r_0 and the maximal right error of a is r_1, which is to say that the precise value of the lower boundary sits within $(a-r_0, a+r_1)$; likewise, suppose the agents learn that the maximal left error of b is r_2 and the maximal right error of b is r_3, which is to say that the precise value of the upper boundary sits within $(b-r_2, b+r_3)$. The story permissivists can provide can be generalized as the situation in which the outcome of error estimation is such that $a+r_1<b-r_2$. Call this situation

Error Model I.

Error Model I: The error estimation for the original credence range is such that a+r_1<b-r_2.

Let the *safe range* of a credence interval be the maximal range such that each credence within it is considered as being definitely rational; let the *impossible range* of a credence interval be the maximal range such that each credence within it is considered as being definitely irrational; let the *risk range* of a credence interval be the maximal range such that each credence within it is considered as being possibly irrational but not definitely irrational; let the *stable range* of a credence interval be the maximal range such that any credence from it is not rationality-dominated by any other credence. We can represent *Error Model I* in Figure 2.

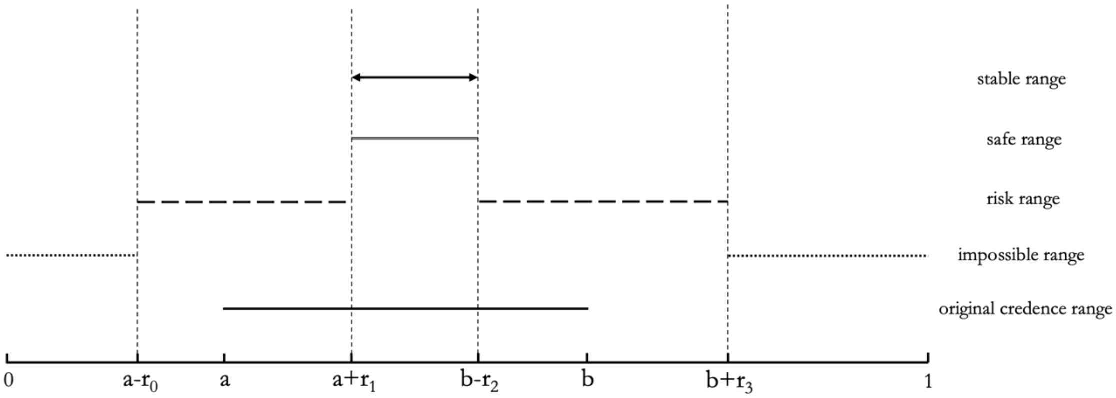

Figure 2: Error Model I $(a + r_1 < b - r_2)$

In *Error Model I*, the safe range is [a+r_1, b-r_2], the risk ranges are (a-r_0, a+r_1) and (b-r_2, b+r_3), and the impossible ranges are [0, a-r_0] and [b+r_3, 1]. The stable range is the same as the safe range in *Error Model I.* The Dominance Condition fails for the stable range in *Error Model I* because the middle credence in the safe range does not rationality-dominate the edge credence of the safe range. In line with the Risk-hedging Requirement, it is rational for the agent only to hold a credence from the safe range. Therefore, cases of *Error Model I* are still permissive cases.

The supporters of the DA may still reject the story that permissivists provide in *Error Model I*. That is to say, they hold that either a+r_1>b-r_2 or a+r_1=b-r_2. Call the former situation *Error Model II* and the latter *Error Model III.*

Error Model II: The error estimation for the original credence range is such that a+r_1>b-r_2.

Error Model III: The error estimation for the original credence range is such that a+r_1=b-r_2.

For *Error Model II*, no safe range is formed. The risk range is (a-r_0, b+r_3), and the impossible ranges are [0, a-r_0] and [b+r_3, 1]. For the risk range, (1) each credence from the range (a-r_0, b-r_2) is rationality-dominated by the credence b-r_2, (2) each credence from the range (a+r_1, b+r_3) is rationality-dominated by the credence a+r_1, and (3) no credence within the range [b-r_2, a+r_1] is rationality-dominated by other credences[3]. So, a stable range [b-r_2, a+r_1] emerges in *Error Model II*. The Dominance Condition fails for this stable range in *Error Model II* because the middle credence from this stable range does not rationality-dominate the edge credence. In line with the Risk-hedging Requirement, it is rational for the agent only to hold a credence from the stable range[4]. Therefore, cases of *Error Model II* are still permissive cases. We can represent *Error Model II* in Figure 3.

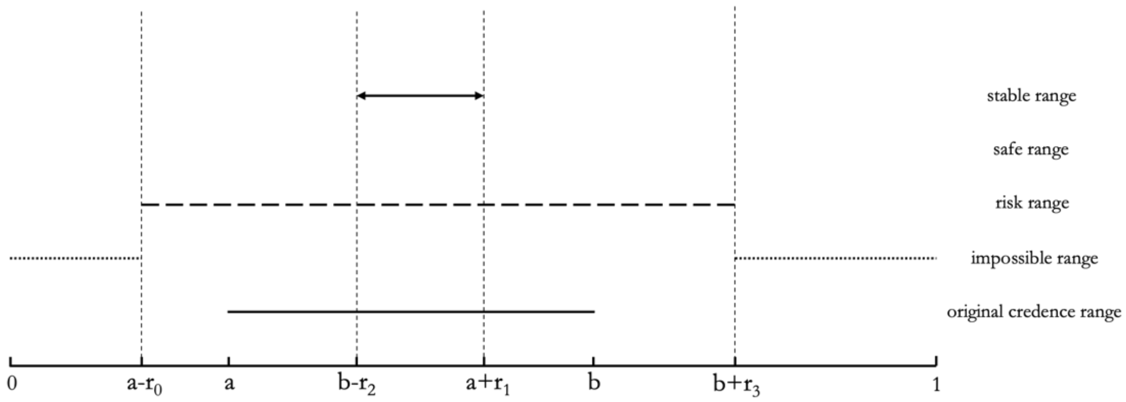

Figure 3: Error Model II $(a + r_1 > b - r_2)$

For *Error Model III*, there is one unique safe credence (a+r_1=b-r_2) that rationality-dominates each credence from the risk range. In line with the Risk-hedging Requirement, it is only rational to adopt this unique safe credence. The original credence range is shrunk to a stable point. Therefore, cases of *Error Model III* are uniqueness cases. We can represent *Error Model III* in Figure 4.

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[3] *Proof*: Following the Range Requirement, let us assume that in every sufficiently nearby possible world, the permissible range is a single continuous interval. (1) Suppose c is any credence that sits within (a−r_0, b−r_2). Since c<b−r_2, and the precise value of the upper boundary of the original credence range is larger than b−r_2, any credence range in every sufficiently nearby possible world that includes c must also include b−r_2. However, the credence range [b−r_2, a+r_1] includes b-r_2 rather than c. Therefore, the credence with value b−r_2 rationality-dominates c; (2) Suppose c is any credence that sits within (a+r_1, b+r_3). Since c>a+r_1, and the precise value of the lower boundary of the original credence range is less than a+r_1, any credence range in every sufficiently nearby possible world that includes c must also include a+r_1. However, the credence range [b−r_2, a+r_1] includes a+r_1 rather than c. Therefore, the credence with value a+r_1 rationality-dominates c; (3) First, suppose c_1 and c_2 are any two credences such that each of them sits within [b-r_2, a+r_1], and c_1<c_2. It is a fact that $c_1 < \frac{c_1+c_2}{2} < c_2$. Since the credence range $[\frac{c_1+c_2}{2}, c_2]$ includes c_2 rather than c_1, c_2 is not rationality-dominated by c_1. Since the credence range $[c_1, \frac{c_1+c_2}{2}]$ includes c_1 rather than c_2, c_1 is not rationality-dominated by c_2; Second, suppose c is any credence that sits within [b−r_2, a+r_1] and c* is any credence that sits within [0, b-r_2) or within (a+r_1, 1]. Since the credence range [b-r_2, a+r_1] includes c rather than c*, c is not rationality-dominated by c*. Therefore, no credence within the range [b-r_2, a+r_1] is rationality-dominated by other credences.

[4] One might wonder whether it is rational to hold a credence within the stable range, given that no credence within the stable range is considered definitely rational in *Error Model II*. My response is that the Risk-hedging Requirement only says that we should avoid holding any dominated credence. Therefore, holding a credence from the stable range is consistent with the Risk-hedging Requirement.

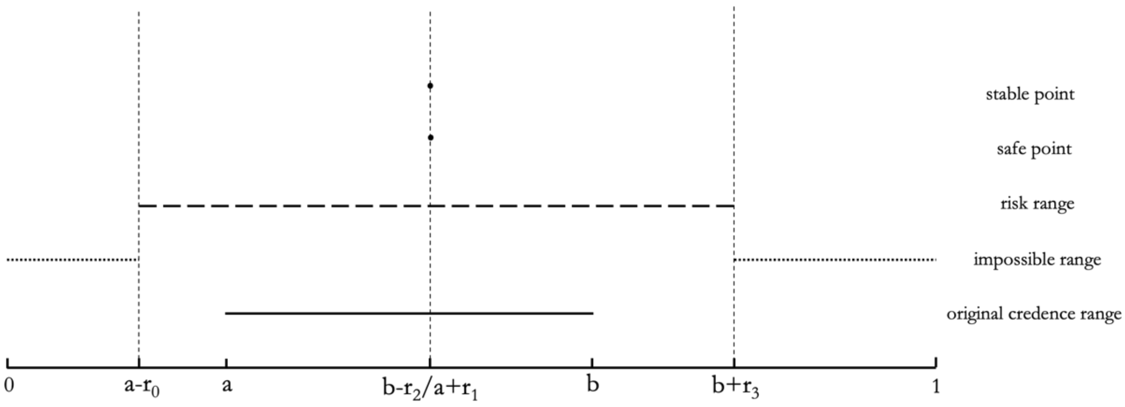

Figure 4: Error Model III ($a + r_1 = b - r_2$)

It is time to conclude what the DA can and cannot do in different permissive cases. In *Error Model I*, risk assessment shrinks the original credence range from [a, b] to the new stable range [a+r_1, b-r_2]. In *Error Model II,* risk assessment shrinks the original credence range from [a, b] to the new stable range [b-r_2, a+r_1]. Thus, the permissive cases in both *Error Model I* and *Error Model II* support the New Stable Range Phenomenon. *If the supporters of the DA deny the New Stable Range Phenomenon, they have to claim that only cases of Error Model III, in which* a+r_1=b-r_2*, are possible*.

However, it is implausible that only cases of *Error Model III* are possible. On the one hand, for an original credence range [a, b], r_1 and r_2 represent the maximal right error of a and the maximal left error of b, respectively. This implies that r_1 and r_2 arise from error estimations about *different* boundaries and are thus generally *independent*. Hence, there is no clear reason to expect that a+r_1=b-r_2 in every possible case. On the other hand, there are *prima facie* cases of *Error Model I* and *II*. For example, in the scenario illustrated in Figure 1 of Section 2, error estimation shrinks the original range [0.3, 0.7] to the stable range [0.4, 0.6] rather than a single point. Accordingly, the DA is not a compelling challenge to Permissivism.

One might respond that we could show that any stable range in *Error Model I* or *Error Model II* would collapse into a unique point. Take *Error Model I*, for example. One may follow Schultheis's argument (2018, p.865) and appeal to a fully general principle like IMP:

> IMP: For *any* permissive rational credence range [a, b], the agent should believe that the lower boundary is not precisely a and the upper boundary is not precisely b, and that there exist a* and b* such that a<a*<b*<b, where a* rationality-dominates a and b* rationality-dominates b.

IMP shrinks the original range [a, b] into a narrower stable range [a*, b*]. Reapplying IMP to [a*, b*] yields a narrower range [a**, b**] in principle, and further *iterative* application can continue shrinking this stable range until it collapses to a single point.[5] IMP can be viewed as a generalized Dominance Condition targeting the stable range in *Error Model I*.

I accept Schultheis's argument for IMP's first application. However, I resist its *iterative* application. (1) Schultheis rightly pushes permissivists to accept that the boundaries of the *original* credence range [a, b] are not precise. This triggers the first error estimation and produces the new stable range [a*, b*] in *Error Model I*. (2) The second application of IMP, however, should be rejected. The new stable range is not merely another credence range; it is the product of a prior error estimation. Within *Error Model I*, once [a*, b*] has been determined, all credences within it are regarded as definitely rational. Therefore, there is no further need for error estimation. Consequently, a stable range in *Error Model I* should not be collapsed into a single point.[6]

This section concludes that the Dominance Condition is not compelling because permissivists can plausibly maintain that sometimes a new stable range emerges from the original range after error estimation[7]. In the next section, I will argue that the Risk-hedging Requirement, another key premise of DA, is also not compelling.

4. My Second Response to the DA: Rejecting the Risk-hedging Requirement

The Risk-hedging Requirement has some plausibility. It says that if an agent is justified in believing that c

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[5] I would like to thank the editors for suggesting this response on behalf of Schultheis, and for urging me to clarify why IMP cannot be generalized to target stable ranges.

[6] One might wonder: what if one is uncertain that the stable range is indeed stable. On my analysis, this amounts to uncertainty about errors (e.g., the values of r_0, r_1, r_2, or r_3). But suppose one is uncertain about these errors. In that case, one should also suspend confidence in the rationality-dominance relations among credences within the original range, since such relations are fixed by the results of error estimation. Hence, one should likewise be uncertain about whether one's present credences are dominated. If one is uncertain about both stability *and* dominance, it is not at all clear that there is any rational pressure to change one's credence. I am grateful to an anonymous referee for raising this point.

[7] Bradley (2021) holds that the DA assumes that the agent is certain about the rationality of the middle credence, and the agent is not certain about the rationality of the edge credence. Bradley's objection to the DA is to argue that *either* we focus on ideal agents and ideal agents should be certain about the precise boundaries of the original credence range, *or* we focus on unideal agents, and unideal agents should be uncertain about the rationality of any credence from the credence range. My responses to the DA differ from Bradley's in two respects. First, following footnote 2, the DA in my reconstruction only needs to assume the Dominance Condition rather than a stronger condition in which the agent is certain about the rationality of the middle credence. For example, in *Error Model II*, the agent is not certain that the middle credence is rational, and the middle credence may still rationality-dominates edge credences. Second, I focus on the unideal agents who are aware that they might be wrong about the boundaries of the rational credence range, and who take this possibility into account by performing error estimation. In contrast to Bradley's responses, in *Error Model I*, unideal agents *are certain* about the rationality of every credence from the safe range after error estimation; in *Error Model II*, though, unideal agents are *not certain* about the rationality of any credence after error estimation. No matter which case it is, the Dominance Condition works for the original permissible range and fails for the new stable range.

rationality-dominates c*, it is irrational for them to hold c*. The main motivation for the Risk-hedging Requirement is that one should avoid taking a larger risk of being irrational when there is a less risky alternative. In this section, I will argue that the Risk-hedging Requirement is not compelling. If we care about both truth and informativeness, it can be rational to risk being wrong to pursue, say, informativeness.

I will use the term '*rationality norms*' to refer to the norms that govern rational credence. What kind of rationality norms should permissivists accept? A natural answer to this question is '*truth-conducive norms*', the norms that are truth-conducive[8]. For the sake of argument, let us suppose that for total evidence E and proposition P, in some cases, there is a posterior credence *range* for P such that every credence from this range satisfies the truth-conducive norms.

In addition to the virtue of truth-conduciveness, other kinds of theoretical virtues, such as scope, explanatory power, simplicity, and unification, are often accepted by the philosophers who adopt Inference to the Best Explanation (IBE). The question of which kinds of theoretical virtues are truth-conducive and whether they can be combined into or explained by truth-conducive norms remains controversial. These questions involve recent disputes regarding whether IBE is compatible with Bayesianism[9].

Suppose $\mathrm{Pr}(.)$ is one of the credence functions that satisfy the truth-conducive norms. Following Cabrera (2017), I divide theoretical virtues in IBE into truth-conducive virtues and informative virtues based on whether the virtue is relevant to the question of whether $\mathrm{Pr}(\mathrm{H}_1|\mathrm{E}) > \mathrm{Pr}\ (\mathrm{H}_2|\mathrm{E})$ when we compare H_1 that possesses the virtue with H_2 that does not: *truth-conducive virtues* make it the case that, other things being equal, $\mathrm{Pr}(\mathrm{H}_1) > \mathrm{Pr}\ (\mathrm{H}_2)$ or $\mathrm{Pr}(\mathrm{E}|\mathrm{H}_1) > \mathrm{Pr}\ (\mathrm{E}|\mathrm{H}_2)$. In contrast, *informative virtues* do not (Cabrera 2017, p.1252).

The core idea underlying this distinction is that truth-conducive virtues can make a theory *more likely to be true*. For example, explanatory power is arguably a truth-conducive virtue. If theory H_1 entails some observational consequence O and theory H_2 does not, then $\mathrm{Pr}(\mathrm{O}|\mathrm{H}_1) > \mathrm{Pr}\ (\mathrm{O}|\mathrm{H}_2)$. Cabrera (2017) argues that at least the following virtues are NOT truth-conducive:

[8] There are different understandings of truth-conduciveness. One popular interpretation in recent years is accuracy-conduciveness. See Horowitz (2014), Schoenfield (2015), and Ye (2023) for the connection between accuracy-conduciveness and truth-conduciveness. Some philosophers argue that Probabilism and Conditionalization are accuracy-conducive. See, for instances, Pettigrew (2011) and Briggs and Pettigrew (2020).

[9] For more recent discussion about the relation between Bayesianism and IBE, see Lipton (2004), Roche (2013), Henderson (2014), Glymour (2015), Cabrera (2017), Lange (2022), etc.

Precision: If a theory provides more detail, it has the virtue of precision.

Scope: If a theory can be applied to a wide-ranging field, it has the virtue of scope.

Following Cabrera's (2017) terminology, I also call the virtues mentioned above *informative virtues*—properties that do not make one theory more probable but rather give it greater informative content. Truth-conducive virtues and informative virtues are linked with two different goals. The goal of pursuing a theory on the basis of truth-conducive virtues is truth, while the goal of pursuing a theory on the basis of informative virtues is informativeness.

If rational subjects care about both truth-conduciveness and informativeness, this will yield counterexamples to the Risk-hedging Requirement. Consider the following case. Suppose the original posterior rational range is [0.3, 0.7] and Matt originally holds a credence of 0.7. After error estimation, Matt believes that 0.5 has a lower risk of being irrational than 0.7. The Risk-hedging Requirement says that holding 0.7 is not rational. However, taking informativeness into account, Matt can rationally continue to hold 0.7 because Matt would like to pursue the goal of informativeness, and 0.7 satisfies this goal. For example, suppose that a proposition P, such as a physical theory, has enormous informative virtues (such as having the virtues of scope and precision). Even if the dominating credence 0.5 performs better than the dominated edge credence 0.7 in conforming with truth-conducive norms, Matt may still want to take a higher risk of violating truth-conducive norms to maintain a higher credence of 0.7 because P has informative virtues. Taking a higher risk of being wrong satisfies one's pursuit of informativeness. As a result, it is rational to hold a dominated credence in light of the specific goal of informativeness. Thus, the Risk-hedging Requirement is false[10].

5. Lessons

Popular versions of Permissivism allow for permissible credence ranges. Schultheis's (2018) Dominance

[10] One might reply that in the dispute between IBE and Bayesianism, many Bayesian philosophers have claimed that the truth-conducive norms should not be violated, even if some virtues highlighted by the supporters of IBE should be considered. Otherwise, it will fall prey to a Dutch Book or Accuracy-dominance argument (e.g., van Fraassen 1989, Pettigrew 2021). Here is my response: Although the agent indeed believes holding the edge credence of 0.7 entails a higher risk of violating truth-conducive norms, it does not mean that holding 0.7 *necessarily* violates truth-conducive norms. The edge credence sits in the risk range rather than the impossible range in *Error Models I*, *II,* and *III*. I do not claim that the agent can rationally hold a credence *necessarily* outside the rational range (such as 0.9) because holding such credence definitely violates the truth-conducive norms and is susceptible to Dutch Book and Accuracy-dominance Arguments.

Argument provides an objection to these kinds of Permissivism. She argues that it is irrational for an agent to hold a credence at the edge of the permissible credence range because the agent is justified in believing that the edge credences have a higher risk of being irrational than credences in the middle. The Dominance Argument pushes permissivists to answer two new and general questions about risk assessment. The first is whether a risk assessment of the boundary of the credence range challenges Permissivism. The second is whether it is always irrational to hold a more risky credence when the agent is justified in believing that there is a safer one. This paper answers 'no' to both questions. For the first question, I argue that permissivists have a good story about error estimation to show that a new stable range can emerge such that no credence from this range takes a higher risk of being irrational than any other credence. The Dominance Argument successfully shrinks the original credence range to a narrower range. However, this instability of the original permissible credence range does not imply that Permissivism is false. For the second question, I argue that it is not the case that the agent should always hold a safer credence. If rationality aims at both truth-conduciveness and informativeness, one can take a risk of being wrong to pursue informativeness.

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