ABSTRACT

Belief and Credence: A Defense of the Vague Reduction

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An epistemological issue garnering increasingly more interest is the relation between the doxastic taxonomies of traditional and formal epistemology, and especially the relation between rational, outright belief and credence. Proposed solutions to this issue fall into one of three classes, *viz*. eliminativism, non-reductionism, and reductionism. In this thesis, I introduce and subsequently defend my own variation of the traditional reductionist view, which I call the Vague Reduction. To do so, I consider a score of eliminativist and non-reductionist objections to reductionism, and argue that they all fail; the upshot is that eliminativism is deemed untenable, non-reductionism unfounded, and traditional reductionist views implausible. In turn, I suggest that the Vague Reduction naturally recommends itself as an attractive and viable theory governing the relation between rational belief and credence.

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BELIEF AND CREDENCE: A DEFENSE OF THE VAGUE REDUCTION

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CHAPTER ONE

Defining the Question

1.1 *Introductory Remarks*

What is the relationship between rational, outright belief and credence? To best address this vexed question, we must first clarify our terms. The first of these terms, belief, is a familiar attitude; Eric Schwitzgebel defines it as "the [propositional] attitude we have . . . whenever we take something to be the case or regard it as true."[1] My beliefs are many: I believe that my parents love me; I believe that the Cleveland Browns will not win the Super Bowl next year; I believe that Santa Claus does not exist; and so on. This notion of belief, I should note, belongs firmly to the realm of traditional epistemology, which, in addition to belief, offers us two other potential doxastic attitudes toward a proposition *p*, namely suspension of judgment and disbelief. As this thesis does not primarily concern the nature of belief itself, this rough exposition will suffice.

But what of the two qualifications on belief mentioned above, that it is rational and outright? Let's first consider the latter qualification: outright (or full) belief that *p* is unqualified, in contrast to such hedged assertions as "it is probably the case that *p*," or "there is a good chance that *p*." Outright belief thus lacks the reservation which is a concomitant of probabilistic (i.e. partial) belief; unlike probabilistic belief, outright belief does not come in degrees. An example may prove useful in making the difference more

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[1] "Belief," Eric Schwitzgebel, Stanford Encyclopedia of Philosophy, https://plato.stanford.edu/entries/belief/

salient: suppose I check my phone, and learn that there is a 55 percent chance of rain this evening. Any belief formed on the basis of this new information is, presumably, partial, for it recognizes the somewhat sizable likelihood that it will not rain this evening. On the other hand, suppose a trustworthy friend tells me that she cannot come to class because she has come down with the flu; my subsequent belief that she has the flu is, presumably, an outright belief. Under normal circumstances, I would not believe that "she *probably* has the flu" or that "there is a good chance that she has the flu," but rather simply that she has the flu.

Instead of providing an overly tedious account of outright belief, let's proceed to the former qualification on belief mentioned above, namely that it is rational. Unlike the previous condition, the notion of rationality is notoriously difficult to define; this difficulty is due in large part to the ambiguity afflicting the term itself. Jonathan Cohen, for instance, has suggested that there may be up to nine disparate strands of rationality.[2] Rather than taking on the onerous task of sorting through these various kinds of rationality, an undertaking worthy of a dissertation in its own right, I will be simply following suit with Elizabeth Jackson and using "rational" to mean "a specific strand of epistemic rationality that describes agents with the same cognitive powers as us who respond to evidence as they epistemically ought."[3] By adopting this definition, we accentuate the link between rational belief that *p* and our evidence for *p* which, it seems to me, is integral in everyday uses of the term "rational" by epistemologists and lay folk alike. Further debates concerning rational belief and its necessary and sufficient

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[2] Jonathan Cohen, "Rationality," in *A Companion to Epistemology*, ed. Jonathan Dancy, Ernest Sosa, and Matthias Steup (Malden, MA: Wiley-Blackwell, 2010).

[3] Elizabeth Jackson, "Belief, Credence, and Evidence," *Synthese* (2018): 3.

conditions (e.g. between the internalist and externalist camps), while doubtless worthwhile topics themselves, lie beyond the scope of this thesis. As such, this succinct definition of rationality will suffice.

Having completed our preliminary explication of rational, outright belief, let's turn to its formal counterpart, credence. Whereas beliefs reside in the framework of traditional epistemology, credences reside in the framework of formal epistemology. But what exactly are they? In short, a credence $c(p)$ is a degree of confidence in a proposition p, such that $0 \leq c(p) \leq 1$, where $c(p)$ reflects the probability that p is true, in light of a subject's total available evidence. Credences of 1 are therefore reserved for propositions which a subject deems certainly true, such as tautologies, while credences of 0 are reserved for propositions which a subject deems certainly false, such as logical impossibilities.[4] It's worth mentioning that, within this thesis, the term "credence" refers to *rational* credence—the credence which *ought* to be assigned a given proposition, in light of a subject's total available evidence. As an historical point, credence has been closely linked with betting behavior, with Frank Ramsey first recognizing the connection nearly a century ago.[5] Lara Buchak points out that this link has often been considered definitional; some hold that "one's credence in p is the amount of money one is willing to pay in ordinary circumstances for a bet that yields \$1 if p obtains and \$0 if not."[6] Setting aside the question of whether this definition is apt, credence is at any rate intimately

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[4] As a brief aside, the mere possibility of Descartes' deceptive God may mean that even those propositions which appear to us tautological or logically impossible ought not be assigned credences of 1 or 0; this, however, is a discussion for another day.

[5] Frank Ramsey, "Truth and Probability," in *The Foundations of Mathematics and Other Logical Essays* (Harcourt, Brace and Company, 1931).

[6] Lara Buchak, "Belief, Credence, and Norms," *Philosophical Studies* 169, no. 2 (2013): 286.

related to the betting behavior of an optimal agent. Moreover, unlike the three doxastic attitudes of traditional epistemology, credences come in degrees which are sensitive to the strength of an agent's evidence concerning a proposition *p*.

As I noted above, credence figures heavily into the framework of formal epistemology, a burgeoning field which has recently risen to prominence alongside traditional epistemology. Unlike traditional epistemology, formal epistemology focuses on our degrees of belief, utilizing such tools as formal logic and probability theory to analyze the epistemic constraints imposed on these degrees (e.g. what it means to for our credences to be probabilistically coherent). Conversely, traditional epistemology focuses on the on-off doxastic attitudes such as outright belief, and the epistemic constraints imposed on these attitudes (e.g. what it means for our beliefs to be consistent). By investigating the relation between outright belief and credence, then, we are likewise investigating the relation between traditional and formal epistemology more broadly.

I take it that the notions of both credence and rational, outright belief are now sufficiently clear, making a return to our original question appropriate: what is the relation between the two?[7] In other words: what is the relation between the coarse-grained taxonomy of traditional epistemology and the fine-grained taxonomy of its formal counterpart? In the following section, I survey the current philosophical landscape regarding this question, briefly summarizing the prevailing responses which have been made.

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[7] It's worth reiterating that, within this thesis, my concern is the relation between *normative* belief and credence, i.e. belief which is epistemically rational. Although this point is occasionally overlooked in the literature, or even deemed irrelevant, it will prove particularly pertinent to my later arguments in chapter two. Moreover, it allows me not to delve deeply into the *descriptive* relation between belief and credence, although I touch upon the issue in chapter four.

1.2 *Canvassing Proposed Answers to the Question*

Broadly speaking, proposed answers to this question fall into one of three categories: eliminativism, non-reductionism, and reductionism. Let's consider each of these answers in turn.

According to the eliminativist about rational belief and credence, fine-grained epistemology is capable of wholly supplanting coarse-grained epistemology; credence, she claims, can do all of the legwork formerly delegated to belief. We must be careful, however, not to conflate two forms of eliminativism, *viz*. normative and descriptive eliminativism. The eliminativist of the latter stripe says something like this: contrary to appearances, there is in fact no such doxastic attitude as "outright belief." Talk of our beliefs, she may say, is in fact simply talk about credences, and the notion of belief is no more than a convenient heuristic that allows us to discuss approximately how confident we are in a given proposition without specifying where precisely our $c(p)$ lies in the interval $[0,1]$. Although I should find descriptive eliminativism quite implausible, my concern in this thesis lies not with it, but rather its normative counterpart. In contrast to the descriptive eliminativist, the normative eliminativist may well grant that we have outright beliefs in certain propositions; she will insist, however, that these beliefs are epistemically superfluous and therefore irrational.[8] The same, I should note, is true of her response to the other doxastic attitudes of traditional epistemology, i.e. suspension of judgment and disbelief, which she likewise discards as unnecessary. Rather than believe, disbelieve, or suspend judgment about a proposition p, the normative eliminativist

[8] One brief caveat: the normative eliminativist will hold that outright belief in a proposition is always irrational *so long as* $c(p) \neq 1$. It is an interesting question whether the normative eliminativist will license belief in a proposition p if $c(p) = 1$, though one I will not be touching on further.

maintains that we ought only to assign p a credence $c(p)$, and not bother with the ostensibly outdated doxastic attitudes of traditional epistemology.

The thrust of the normative eliminativist's reasoning is well encapsulated by Robert Stalnaker:

> One could easily enough define a concept of belief which identified it with high subjective or epistemic probability . . . but it is not clear what the point of doing so would be. Once a subjective or epistemic probability value is assigned to a proposition, there is nothing more to be said about its epistemic status . . . So what could be the point of selecting an interval near the top of the probability scale and conferring on the propositions whose probability falls in that in that interval the honorific title "believed?"[9]

On such an account, we may well stipulate that belief in a proposition p is a matter of assigning p a sufficiently high credence in order to assuage any misgivings about doing away with belief entirely, but doing so is deemed unnecessary. The eliminativist thus issues the following challenge to those keen on retaining the doxastic framework of traditional epistemology, *viz*. to procure a role for outright belief which cannot be fulfilled by credences alone. This challenge, as I argue in chapter four, is not insurmountable; for the time being, though, I defer further discussion of this brand of eliminativism until then.

The second response alluded to earlier, non-reductionism, departs from eliminativism in that it allows for rational belief in certain propositions. On non-reductionism (which I'll be using interchangeably with dualism), we have rational beliefs and we likewise have credences, and, crucially, the former is not simply reducible to the latter.[10] Partially motivating such accounts are cases in which rational belief appears

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[9] Robert Stalnaker, *Inquiry* (Cambridge, MA: MIT Press, 1984), 138.

[10] Defenders of this brand of "belief-credence dualism" include Buchak (2013), Jackson (2019), and Staffel (2015).

divorced from credence; the Blue Bus Case, discussed extensively in chapter three, is one particularly influential case which purportedly lends support to the dualist's view.[11] Other common motivators for belief-credence dualism include such cases as the Lottery and Preface Paradox, which purport to make impossible a direct reduction from belief to credence, while nonetheless avoiding eliminativism by finding a distinct role that beliefs have to play; these, too, will be discussed in chapter three.

The arguments for non-reductionism are, therefore, manifold, and proponents of non-reductionism are, unsurprisingly, not agreed on the proper role that both belief and credence have to play in our doxastic lives. A common enough response, for instance, is that mere statistical evidence is not sufficient for outright belief, and in turn that rational outright belief requires at least *some* non-statistical evidence.[12] At any rate, analysis of the disparate stripes of dualism and their respective merits and shortcomings lies beyond the scope of this thesis; a brief description of dualism as the thesis that we have both rational beliefs and credences, where the former are not reducible to the latter, will suffice.

The last class of responses to the question at hand can be subsumed under the broad category of reductionism. On reductionism, we have both rational, outright beliefs and credences, and the former can be reduced to latter.[13] Like the dualist, the reductionist

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[11] Such cases, as will later become evident, suggest that evidence type figures into the discussion of whether belief is epistemically rational, and thus the same credence, $c(p)$, can license outright belief in some propositions while not licensing it others, depending on the type of evidence for p.

[12] Advocates of this response, which is discussed more thoroughly in chapter three, include Kaplan (1996), Nelkin (2000), and Jackson (2019).

[13] It goes without saying, of course, that the reductionist need not be able to procure the actual reduction which governs the relation between belief and credence in order to be a reductionist, though as we will see, a variety of forms of reductionism have been advanced.

refuses to abrogate the traditional notion of rational belief, yet unlike the dualist, she holds that, from the formal features of an agent's credal state alone, we can (at least in principle) discern whether an agent epistemically *ought* to believe that p.[14] To reiterate, the reductionism with which I am concerned is normative in nature, and thus leaves open the descriptive question of whether an agent's outright belief that p simply *is* a matter of having some particular credal state.

Although I have spoken thus far of the formal features of an agent's credal state, the most prevalent reductionist account—the Lockean Thesis—considers credence alone. According to the Lockean Thesis (also referred to as the Straightforward Reduction and the Threshold View), belief that p is epistemically licensed when $c(p)$ falls at or above a given threshold, disbelief is epistemically licensed when $c(p)$ falls at or below a given threshold, and suspension of judgment is epistemically licensed when $c(p)$ falls between the two thresholds. Put more formally: for some a and b such that $0 \leq a < b \leq 1$, the Lockean Thesis holds that disbelief is epistemically licensed if and only if $c(p)$ lies in the interval $[0, a]$, belief is epistemically licensed identical if and only if $c(p)$ lies in the interval $[b, 1]$, and suspension of judgment is epistemically licensed if and only if $c(p)$ lies in the interval (a, b).[15]

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[14] I speak of the formal features of an agent's credal state, rather than merely its credence itself, in order to include other formal features which may bear on a possible reduction. One such feature, for instance, is stability, i.e. the extent to which $c(p)$ is liable to change in light of new evidence; stability plays a pivotal role in Leitgeb's (2014) aptly-named Stability Theory of Belief.

[15] Of course the intervals could also be arranged such that suspension of judgment is equated with having a credence *x* in the closed interval $[a, b]$, rather than the open interval (a, b), yet the decision of which intervals ought to be closed versus open appears arbitrary for all values of a and b other than 0 and 1, respectively. However, if we were to let $a = 0$ and $b = 1$, then suspension of judgment would have to be identified with having a credence $x \in (a, b)$, lest we are compelled to suspend judgments for absolutely all propositions.

While the Lockean Thesis is both the simplest and most prevalent reductionist account relating outright belief and credence, it is far from the only reductionist view which has been put forth. Other more recent, and indeed more complex, theories such as Leitgeb's "stability theory of belief," as well Arló-Costa and Pedersen's similar account focusing on high probability cores, are likewise worthy of consideration as viable reductionist accounts.[16] Regretfully, though, they lie beyond the scope of this thesis, and so must be set aside as fruitful topics for another day. Thus, I will henceforth be treating the Lockean Thesis, and later my own variation thereof, as the official representative of the reductionist camp. To reiterate, this particular brand of reductionism has as its core the following claim: whether belief that p is epistemically rational depends on whether $c(p)$ lies at or above some threshold $x \in [0, 1]$.

Having constructed our preliminary taxonomy of the possible answers to the question at hand, we can now advance onward into the heart of the thesis itself. Before doing so, however, I briefly outline the path which lies ahead, thereby delineating my plan to first introduce and subsequently defend my own view, the Vague Reduction.

1.3 Sketching the Path Forward

In the following chapters, I examine many of the common objections which have been brought against the traditional reductionist account, *viz*. the Lockean Thesis, and argue that they all fail to constitute a decisive blow against it. I will proceed as follows: in chapter two, I first consider a more recent argument against the Lockean Thesis made by Jane Friedman in her essay, "Rational Agnosticism and Degrees of Belief," and

[16] Horacio Arló-Costa and Arthur Pedersen, "Belief and Probability: A General Theory of Probability Cores," *International Journal of Approximate Reasoning* (2012).

suggest that it fails, owing to a misapplication of the absence of evidence norm. I subsequently use Friedman's argument as a springboard to present a sorites argument of my own against the Lockean Thesis, and find the sharp credence cutoffs governing our traditional doxastic attitudes dubious; this allows me to introduce my own modified reduction from rational outright belief to credence which admits of vagueness.

Upon introducing this modification to the Lockean Thesis, in chapter three I consider two classes of arguments which ostensibly lend support to belief-credence dualism, and thus purport to undermine my Vague Reduction. In response to the first class of arguments, which depend upon the conjunction principle (i.e. the claim that rational beliefs are closed under conjunction), I construct an argument against the conjunction principle in hopes of undermining the arguments themselves. In response to the second class of arguments, which purport to show that rational belief and credence can depart from one another in cases with merely statistical evidence, I call the intuitions prompted by such cases into question.

Subsequently, in chapter four I consider the claim made by the eliminativist about rational belief, namely that credence can wholly supplant rational belief within our doxastic framework, leaving us with nothing save the fine-grained taxonomy of formal epistemology. To suggest that eliminativism is untenable, I present and defend Buchak's anti-eliminativist argument which holds that, within our norms governing the practice of blame, the notion of rational belief is indispensable and cannot be supplanted by credence alone. Although at first blush, Buchak's argument would appear to rest upon normative dualism, I demonstrate that this need not be the case, and that my endorsement of her argument is in fact wholly compatible with my reductionist commitments.

Lastly, in chapter five I bring the broader implications of the thesis into clearer focus by clarifying how the arguments of chapters two through four constitute a cohesive defense of the Vague Reduction as a viable and attractive theory governing the relation between rational belief and credence. I conclude by offering a few questions which this thesis raises as natural fields of inquiry for those keen on further investigation.

CHAPTER TWO

The Straightforward Reduction and Vagueness

2.1 *Introductory Remarks*

In this chapter, I consider an argument against the Straightforward Reduction advanced by Jane Friedman in her essay, "Rational Agnosticism and Degrees of Belief."[1] In short, Friedman maintains that any variation of the Straightforward Reduction is destined to fail, utilizing certain conjunctions to argue that rational suspension of judgment cannot be directly reduced to credence. After outlining Friedman's argument in § 2.2, I subsequently argue in § 2.3 that her critique is unsuccessful by revealing the unsavory implications of her reasoning with respect to other such conjunctions, and thus suggest that her mistake stems from a misapplication of the absence of evidence norm. Thereafter in § 2.4, I construct a sorites argument against the Straightforward Reduction which finds specious the sharp cut-offs posited by Straightforward Reductionists, and submit that it constitutes a more forceful case for Friedman's initial conclusion. To conclude, I utilize supervaluationism to introduce a variant of the Straightforward Reduction which admits of vagueness and so is less susceptible to soritical criticisms, which I ultimately proceed to defend in the following chapters.

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[1] Jane Friedman, "Rational Agnosticism and Degrees of Belief," *Oxford Studies in Epistemology* 4, (2013).

2.2 *Friedman's Argument*

As I noted in chapter one, the Straightforward Reduction is the standard representative of reductionism. To reiterate, at the heart of the Straightforward Reduction lies the following claim: for some a and b such that $0 \leq a < b \leq 1$, disbelief is epistemically rational if and only if $c(p)$ falls in the closed interval $[0, a]$, belief is epistemically rational if and only if $c(p)$ falls in the closed interval $[b, 1]$, and suspension of judgment is epistemically rational if and only if $c(p)$ falls in the open interval (a, b). Disbelief in p, I should mention, is declared tantamount to belief that $\neg p$.[2]

In her essay, Friedman seeks to demonstrate that the Straightforward Reduction is a failed enterprise, arguing that the only viable candidates for a and b are in fact 0 and 1, respectively, which is for various reasons an undesirable outcome.[3] To reach her conclusion, she relies heavily on the absence of evidence norm, which posits that "in the absence of evidence for or against an ordinary contingent proposition *p*, it is epistemically permissible to suspend judgment about *p*."[4] In those instances where a subject has no evidence either in favor of or against *p*, the absence of evidence norm dictates that suspension of judgment about *p* is rationally allowed. Friedman correctly observes that, if we are to reject this norm, we must conclude that there are cases in which a subject has no evidence supporting either *p* or ¬*p* where she nevertheless is

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[2] Friedman, "Rational Agnosticism," 1.

[3] I'm inclined to agree with Friedman that, if we must identify belief only with a credence of 1 and disbelief only with a credence of 0, the Straightforward Reduction must be discarded, as it's dubious how often we can rationally assign propositions credences of 0 and 1. Indeed, the upshot of this would be that we must remain agnostic about nearly all meaningful propositions.

[4] Ibid., 4.

prohibited from suspending judgment; here I wholeheartedly agree with her that "it is extremely difficult to see how that could be right."[5] As such, I grant that the absence of evidence norm is valid, and have no intention of disputing it.

Bearing this norm in mind, Friedman invites us to consider a subject, *S*, and offers the following hypothetical:

> Say *S* is given a drawing of a snowflake and is told that real snowflakes from different locations will be collected. She is asked to consider, for each collected snowflake, whether that snowflake has the same structure or shape as the one in her drawing . . . This *S* does not know very much about snowflakes, in fact she's never seen any before (she's from a small island in the tropics) . . . There is simply nothing in her body of total evidence that bears on whether the collected flakes match her flake drawing.[6]

Most significant here is the final sentence, which establishes that *S* has no evidence relevant to whether the snowflakes will match the snowflake in her drawing; this paucity of evidence brings the absence of evidence norm into play. Friedman subsequently designates a_1 as the proposition that the first snowflake is a match, a_2 as the proposition that the second snowflake is a match, continuing on until a_n for some finite *n*. With regard to a_1, the proposition that the first of the collected snowflakes matches that of her drawing, it would appear the absence of evidence norm allows us to suspend judgment, neither believing nor disbelieving it. So too for the proposition corresponding to the second snowflake, a_2, as well as the proposition corresponding to the third snowflake, a_3, suggests Friedman.[7] Taken individually, it seems clear that suspending judgment with

[5] Ibid., 6.

[6] Ibid., 7.

[7] Ibid., 7.

respect to each proposition is epistemically permissible, as *S* has no evidence for or against any of the given propositions.

The permissibility of suspending judgment seems true of individual propositions a_1 through a_n, but what of the conjunction of multiple propositions? Take for instance the conjunction $(a_1 \wedge a_2 \wedge a_3)$, that the first three snowflakes will all match that of the drawing; does the absence of evidence norm apply to this as well? Friedman suggests that it ought to, arguing, "if we're to imagine that *S* has no evidence at all that is relevant to whether $a_1 - a_3$ is true or false, and that she has no other evidence relevant to whether that conjunction or disjunction of those propositions is true or false, then it looks as though she also has no evidence relevant to whether the conjunction and disjunction are true or false."[8] Thus, in the given snowflake-hypothetical, Friedman claims that *S* can suspend judgment regarding the proposition that snowflakes one through three will match the snowflake in her drawing. Moreover, she suggests that this reasoning pertains equally well to longer conjunctions, such as $(a_1 \wedge a_2 \wedge \ldots \wedge a_{10})$, for *S* is once again permitted to suspend judgment about each individual proposition in the set, and we seemingly have no evidence bearing on the conjunction. Indeed, it appears this rationale is valid for yet longer conjunctions, with Friedman noting, "[S] might consider whether the first 100 flakes are a match, or the first 1000, and so on. Our reasoning about $a_1 - a_3$ carries over."[9] However, if Friedman is correct in this assertion, it spells doom for the Straightforward Reduction.

[8] Ibid., 8.

[9] Ibid., 8.

To better understand why this is the case, recall our first pass at the Straightforward Reduction which let $a = \frac{1}{3}$ and $b = \frac{2}{3}$, and therefore identified suspension of judgment regarding a proposition p with having a credence $c(p)$ such that $\frac{1}{3} < c(p) < \frac{2}{3}$. Assuming our subject *S* is permitted to suspend judgment with respect to each individual proposition a_1 through a_n, the credence assigned each proposition falls in the interval $(\frac{1}{3}, \frac{2}{3})$. Even concerning the smaller conjunction of $(a_1 \wedge a_2 \wedge a_3)$, this has problematic repercussions; as Friedman observes, "given a_1, a_2, and a_3 are probabilistically independent, $C_s(a_1 \wedge a_2 \wedge a_3)$ ought to be equal to $C_s(a_1)\ C_s(a_2)\ C_s(a_3)$," where $C_s(a_n)$ is the credence assigned to a given proposition.[10] Yet this means that $C_s(a_1 \wedge a_2 \wedge a_3)$ cannot itself lie in the interval $(\frac{1}{3}, \frac{2}{3})$—on the contrary, $C_s(a_1 \wedge a_2 \wedge a_3)$ would be located in the interval $((\frac{1}{3})^3, (\frac{2}{3})^3)$, which roughly equals (0.037, 0.296). As such, the subject *S* would no longer be permitted to suspend judgment regarding the conjunction $(a_1 \wedge a_2 \wedge a_3)$, as $C_s(a_1 \wedge a_2 \wedge a_3)$ falls outside the interval of $(\frac{1}{3}, \frac{2}{3})$. With larger conjunctions this issue is swiftly compounded; $C_s(a_1 \wedge a_2 \wedge \ldots \wedge\ a_{10})$, for instance, is located in the interval $((\frac{1}{3})^{10}, (\frac{2}{3})^{10})$, approximately equal to (0.00002, 0.01734). Once again, it appears the Straightforward Reductionist is compelled to claim that we cannot suspend judgment regarding this conjunction, which stands in stark contrast with the conclusion yielded by the absence of evidence norm.

More importantly, though, this issue is not unique to the form of the Straightforward Reduction which lets $a = \frac{1}{3}$ and $b = \frac{2}{3}$; in fact, for any pair of values a

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[10] Ibid., 9.

and b within the interval (0,1), the conjunction can be extended such that its corresponding credence falls outside (a, b), yet as Friedman argued earlier, the absence of evidence norm would seem to make it epistemically permissible to withhold judgment regardless of the conjunction's size.[11] Indeed, the only two values of a and b which enjoy immunity from this problem are 0 and 1, respectively, such that belief is equated with a credence of 1, disbelief with a credence of 0, and suspension of judgment with all credences in (0, 1). In short, this is because $C_s(a_1 \wedge a_2 \wedge \ldots \wedge\ a_n)$ will always remain in the open interval (0, 1), assuming the credences of each individual proposition are themselves within (0, 1).[12] Thus, if successful, the upshot of Friedman's argument is that the Straightforward Reduction fails, for it has no choice but to equate belief with a credence of 1, and disbelief with a credence of 0, a conclusion which requires us to remain agnostic about all meaningful propositions.

2.3 *Critique of Friedman's Argument*

It seems to me, however, that Friedman's argument is flawed, as it stems from a misapplication of the absence of evidence norm; to see why this is the case, an appeal to another hypothetical is in order. Suppose we are given a subject, *S*; a true lover of wisdom, *S* is a philosophy major, and like most philosophy majors, she knows little at all about quantum mechanics. Much to her chagrin, *S* is forced to take a true-false test about quantum mechanics, with a finite number of questions *n*. Each of these *n* questions is

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[11] Ibid., 11.

[12] Recall, if you will, that Friedman argued it is epistemically permissible to suspend judgment regarding each individual proposition in the set $(a_1, a_2 \ldots a_n)$, and thus each individual credence is between 0 and 1, making it impossible that $C_s(a_1 \wedge a_2 \wedge \ldots \wedge\ a_n)$ is itself either 0 or 1. I take it this is fairly obvious.

randomly selected from a finite bank of questions, of which half are true and half are false. Moreover, when each question is selected, a new question is added to the bank with the same answer as that of the previously selected question—this ensures that, at any time the bank consists of half "true" answers and half "false" answers.

Now let b_1 be the proposition that the correct answer to the first question is true, b_2 the proposition that the correct answer to the second question is true, continuing on until we reach b_n, the proposition that the correct answer to the n^{th}question is true. Suppose that, with respect to each question, *S* has no evidence bearing on the likelihood that the correct answer is either true or false. As such, the absence of evidence norm suggests it is permissible for *S* to suspend judgment about each individual proposition in the set (b_1, b_2 . . . b_n). Once again, it's difficult to see how this could be false. Moreover, our question-replacement protocol ensures that the propositions in the set are all probabilistically independent; applying Friedman's reasoning from the snowflake case, then, it would seem that *S* is permitted to suspend judgment about potential conjunctions of any propositions within (b_1, b_2 . . . b_n), if we are to be consistent. This, however, has strikingly counterintuitive implications. Take, for instance, the conjunction $(b_1 \wedge b_2 \wedge \ldots \wedge\ b_{10})$, which represents the proposition that the correct answer to all of the first ten questions is true—it seems dubious that the absence of evidence norm allows us to suspend judgment about this conjunction, rather than disbelieve it. The reasoning utilized by Friedman in her snowflake hypothetical, though, leads directly to this conclusion.

Nevertheless, perhaps with regard to the smaller conjunction $(b_1 \wedge b_2 \wedge \ldots \wedge\ b_{10})$, our intuitions lead us to consider it at least permissible to suspend judgment. Yet, as I previously pointed out, Friedman argues that the absence of evidence norm applies to much longer conjunctions as well; recall that, in the snowflake case, she holds it permissible to suspend judgment about "whether the first 100 flakes are a match, or the first 1000."[13] Taken with respect to our unfortunate philosophy major, this implies that she is likewise allowed to remain agnostic about the proposition that the first 100 correct answers are true, or even the first 1,000. This claim certainly seems mistaken, but let's briefly examine the likelihood that these conjunctions are true to see how problematic it is. Given that *S* has no evidence either for or against b_1, it's standard to assign b_1 a credence of 0.5. This rationale applies equally well to each proposition in the set $(b_1, b_2 \ldots b_n)$, and therefore all propositions $b_1 - b_n$ are assigned a credence of 0.5. Since we have established that these propositions are probabilistically independent, the likelihood that the first 100 correct answers are true, $C_s(b_1 \wedge b_2 \wedge \ldots \wedge\ b_{100})$, is equal to 0.5^{100}. To put that into perspective, that's about one in $1.27\ \times\ 10^{30}$. Still, that sum merely scratches the surface—$C_s(b_1 \wedge b_2 \wedge \ldots \wedge\ b_{1000})$, the likelihood that the first 1,000 correct answers are true, is about one in $1.07\ \times\ 10^{301}$, a sum which, if written out, would consist of 302 numbers. Remaining agnostic with respect to these conjunctions thus seems altogether unreasonable, yet it is the option to which Friedman is consigned if she is to be consistent in her application of the absence of evidence norm.

In turn, as Friedman's usage of the absence of evidence of norm has been shown to be flawed, her argument against the Straightforward Reduction collapses. Nevertheless, I admit that her snowflake case has a sort of intuitive appeal; it *does* seem plausible that suspension of judgment about longer conjunctions in her hypothetical (e.g.

[13] Ibid., 8.

that the first 100 snowflakes are a match) is rationally permissible, while it seems impermissible for longer conjunctions in our true-or-false-test hypothetical (e.g. that the first 100 answers are all true). The reason behind this intuitive appeal, I suspect, has something to do with an alternate interpretation of the snowflake hypothetical, which, rather than considering each individual proposition in the set $(a_1, a_2 \ldots a_n)$, considers the generalized proposition, *c*, that all snowflakes are congruent to one another. As in the previous case, our subject *S* has nothing within her body of evidence relevant to whether *c* is true; consequently, she's once more is in a position which makes suspension of judgment rationally permissible. The very possibility of *c*, though, undermines the statistical independence of propositions $(a_1, a_2 \ldots a_n)$; indeed, if *c* is true, the propositions in the set are clearly not independent.[14] This possibility may explain our intuition that it's acceptable to suspend judgment about longer conjunctions in the snowflake case, such as the first 100 snowflakes being a match, as we're left fully ignorant of whether all snowflakes are congruent to one another.

Thus, Friedman's mistake is best characterized as a misapplication of the absence of evidence norm; if the reasoning I've employed has been at all successful, it seems that the absence of evidence norm is in fact inapplicable to conjunctions of probabilistically independent propositions. One potential explanation for this is that, when considering such conjunctions, we no longer lack evidence as we do when considering the individual propositions which compose them. On the contrary, we gain statistical evidence

[14] Once more, in a complete absence of evidence regarding *c*, it's appropriate to assign *c* a credence of 0.5. This significantly complicates our calculations about conjunctions of the *a*-propositions, as we would have to consider the likelihood of conjunctions within $(a_1, a_2 \ldots a_n)$ being true if *c* were true, alongside the likelihood of those conjunctions being true if *c* were false.

demonstrating that conjunctions grow increasingly less likely as they grow in size, thereby making it inappropriate to appeal to the absence of evidence norm. The upshot is that the possibility of the Straightforward Reduction remains intact, as Friedman's critique ultimately fails. To be sure, this is far from an endorsement of the Straightforward Reduction; I merely intended to show that one potential objection to it is not decisive. In the following section I move beyond Friedman's argument, employing a sorites argument to construct a more forceful case against the direct reduction of the three traditional doxastic attitudes to a mere range of credences.

2.4 *Sorites Argument Against the Straightforward Reduction*

Although Friedman's argument against the Straightforward Reduction did not succeed, other arguments may prove effective. In this section, I intend to construct one such argument, utilizing the sorites paradox to illustrate that the sharp credence-thresholds posited by Straightforward Reductionists are implausible and accordingly ought to be rejected.

To set the stage for my argument, consider the subject of the classical sorites paradox: heaps of wheat. The original argument runs something like this: one grain of wheat does not constitute a heap. If one grain of wheat doesn't constitute a heap, neither will two grains. More generally, if n grains of wheat do not constitute a heap, neither will $n + 1$ grains. Therefore (via repetition of *modus ponens*), 1,000,000 grains do not constitute a heap. I take it the paradox here is fairly salient: flawless reasoning from seemingly certain premises leads us to an apparent contradiction, because of course 1,000,000 grains of wheat do in fact constitute a heap.

Broadly speaking, there have been three responses which seek to resolve the paradox. One response which is particularly fashionable among some metaphysicians is to simply deny the existence of heaps; 1,000,000 grains of wheat do not constitute a heap, they suggest, because there is simply no such thing as heaps.[15] Another response to the paradox is to hold that, for n grains of wheat, it is sometimes vague whether the n grains constitute a heap. That is, for certain values of n, it is neither definitely true nor definitely false that the n grains constitute a heap; this claim is often accompanied by the logical semantics known as supervaluationism. The third response to the paradox is to adopt epistemicism, and posit that there is in fact a sharp cut-off, i.e. that there is an n such that n grains do not constitute a heap, whereas $n + 1$ grains do; the epistemicist claims, however, that we are simply ignorant of this cut-off.[16] As will soon become apparent, these three responses to the classical sorites paradox yield analogous responses to my subsequent argument against the Straightforward Reduction. Bearing this in mind, let's proceed to my variation of the classical paradox.

Recall that the Straightforward Reductionist posits the existence of credence thresholds a and b such that $0 \leq a < b \leq 1$, where we ought to disbelieve propositions whose credences fall in the interval $[0, a]$, believe propositions whose credences fall in the interval $[b, 1]$, and suspend judgment about propositions whose credences fall in the

[15] Though my interest in the metaphysics of heaps is only secondary, it's worth mentioning that this response would be that of the metaphysical nihilist and of many restricted compositionists. Van Inwagen (1990), for instance, is one such proponent of restricted composition who would simply deny the existence of heaps. Unfortunately, though, metaphysical vagueness is (arguably) not limited to heaps, as van Inwagen admits. But that's enough about metaphysics.

[16] Williamson (1994) is perhaps the best-known defender of epistemicism, holding that there is a sharp cut-off.

interval (a, b). My initial argument considers only the belief threshold, b, but its inverse which uses the disbelief threshold would function equally well. Now let's suppose that the following claim is true: we ought to believe all propositions which we assign a credence of 1. This seems a safe enough assumption; it's hard to see how we could be entirely certain of a proposition's veracity while nonetheless withholding belief from it. Suppose moreover that, if we ought to believe a proposition p when $c(p) = 1$, then we ought to believe that p when $c(p) = .999$. More generally, if we ought to believe that p when $c(p) = x$, it seems we ought to believe that p when $c(p) = x - 0.001$. The underlying intuition behind this claim, which I defend in greater depth shortly, is that a change in credence of 0.001 should be incapable of causing a radical shift in our doxastic attitude toward p, for instance from outright belief to suspension of judgment. So, via repeated use of *modus ponens,* if we ought to believe that p when $c(p) = 1$, then we ought to believe that p when $c(p) = 0$. But, of course, this stands at odds with the Straightforward Reduction, as it requires that there be some threshold a such that we ought to disbelieve p if $c(p) \leq a$.

How might the Straightforward Reductionist try to respond to this argument? First, it's worth noting that two of the proposed solutions to the classical sorites paradox are not open to the Straightforward Reductionist, namely taking an eliminativist stance towards outright belief or admitting of vagueness and implementing supervaluationism. For suppose first that, similar to the metaphysician denying the existence of heaps, we simply denied the notion of outright belief altogether. Notwithstanding the oddity of this claim, it would also entail that the Straightforward Reduction is false; indeed, if the Straightforward Reductionist rejected the existence of outright belief, she would no longer be a reductionist, but rather an eliminativist about belief. Now consider the second option, namely conceding that there are propositions whose credences are such that it is simply indeterminate whether we ought to believe them. This likewise contradicts the Straightforward Reduction, for the Straightforward Reduction holds by definition that there are sharp thresholds governing which doxastic attitude we ought to have with respect to a proposition *p*. So, the Straightforward Reductionist is consigned to the third response to my sorites argument, *viz*. positing a sharp credence threshold which dictates whether we ought to believe, disbelieve, or suspend judgment about a proposition.

However, this need not necessarily take the form of epistemicism; contra the epistemicist, the Straightforward Reductionist may posit that these credence thresholds are in fact knowable. As such, my subsequent argument against the Straightforward Reduction consists of two phases: I first argue that the two leading candidates for knowable credence thresholds are too restrictive and therefore ought to be rejected, which forces the Straightforward Reductionist to retreat into an epistemicism according to which the credence thresholds are simply unknowable. Afterwards, I intend to drive the final stake into the Straightforward Reduction by suggesting that we have good reason to reject epistemicism about the relation between beliefs and credences.

To commence phase one of my argument, let's consider the first of the two candidates for a knowable belief threshold which the Straightforward Reductionist has at her disposal. This first candidate I refer to simply as the Certainty View; as its name would suggest, the Certainty View identifies the belief threshold with a credence of 1. More precisely, the Certainty View holds that we ought to believe only those propositions assigned a credence of 1, disbelieve only those propositions assigned a credence of 0, and suspend judgments for all propositions assigned a credence $c(p)$ such that $0 < c(p) < 1$. The proponent of the Certainty View thus rejects the second premise of my sorites argument, i.e. that if we ought to believe a proposition p when $c(p) = 1$, then we ought to also believe that p when $c(p) = .999$. One salient advantage of the Certainty View is that its threshold is, at any rate, not arbitrary, for if our credence $c(p)$ drops below 1, we are no longer entirely confident that p. Moreover, it would allow the Straightforward Reductionist to retain her general thesis about the relation between the doxastic taxonomies of formal and traditional epistemology. So, perhaps the Straightforward Reductionist ought to embrace her sharp cut-offs in the form of the Certainty View.

However, outside of these two perks, the Certainty View has little to recommend it. As I noted in § 2.3, the upshot of identifying belief with a credence of 1 and disbelief with a credence of 0 is that we are compelled to suspend judgment about nearly all meaningful propositions. Indeed, although the Certainty View can accommodate belief in tautological propositions and disbelief in logical impossibilities, it leaves little room for much else in its epistemological framework besides an excess of agnosticism. Thus, I will be following suit with the mainstream practice and simply discarding the Certainty View as implausible.[17]

In light of the failure of the Certainty View, let's consider the other candidate for a knowable belief threshold, namely a credence of 0.5. Under this view, which I'll be referring to as the 50-50 View, we ought to believe all propositions assigned credences of

[17] For another argument that the Certainty View is incorrect, see the latter half of Friedman (2013), as she argues that the Certainty View is susceptible to statistical criticism on the basis of prior probabilities.

greater than 0.5, disbelieve all propositions assigned credences of less than 0.5, and suspend judgment about only those propositions assigned credences of precisely 0.5. It's worth noting that, on the 50-50 View, we must suspend judgment about p when $c(p) = 0.5$. For suppose that we ought to believe all propositions whose credence $c(p)$ was such that $c(p) \geq 0.5$; this would imply that, in cases with two mutually exclusive options each assigned a credence of 0.5, we ought to believe both options. Assuming that we ought not hold contradictory beliefs, we must allow for suspension of judgment when a proposition is assigned a credence of 0.5. Much like the Certainty View, the 50-50 View can claim as an advantage a non-arbitrary threshold; when a proposition p is assigned a credence $c(p)$ such that $c(p) > 0.5$, p is more likely true than not, and thus the designation of 0.5 as our belief threshold is, at the very least, not arbitrary. So, the Straightforward Reductionist could also resort to the 50-50 View in response to my sorites argument.

At first blush, the 50-50 View seems substantially more palatable than the Certainty View. One distinct upside of the 50-50 View over the Certainty View is that it grants that propositions need not always have a credence of 1 in order for belief in them to be licensed. So too with disbelief; the 50-50 View does not restrict disbelief to those propositions assigned a credence of 0, and thus squares better with our intuitions. However, the 50-50 View suffers from the inverse of the problem afflicting the Certainty View; whereas the Certainty View requires us to suspend judgment about nearly all propositions, the 50-50 View allows us to suspend judgment about nearly none. Indeed, the proportion of propositions which can be rationally assigned a credence of 0.5 is vanishingly low, and so the 50-50 View dictates that we can only remain agnostic about a relative handful of propositions. Yet, as Fitelson and Shear note, "surely rationality does not (always) *require* belief when an agent is only *slightly* more confident in a proposition than its negation."[18] Thus, assuming we agree that the 50-50 View's account of rational agnosticism is too restrictive, we have good reason to likewise reject it.

So, the two most promising candidates for a knowable belief threshold which were initially open to the Straightforward Reductionist have both proven unsuccessful. Though this places the Straightforward Reduction in hot water, it does not necessarily prove that it is mistaken. For there still remains one route open to the Straightforward Reductionist, namely following suit with the epistemicist and maintaining that the threshold for rational belief is unknowable. However, if this threshold is in fact unknowable, it seems it will likewise be arbitrary, for we have already exhausted the two most plausible candidates for a non-arbitrary threshold in the Certainty and 50-50 View. Unfortunately, I suspect we are nearing philosophical bedrock here; while I doubt I can offer a definitive rebuttal of this form of arbitrary epistemicism, I do think I can provide good reason for concluding that, with regard to beliefs and credences, this variation of epistemicism is even less plausible than in the case of heaps.

First, I'd like to reiterate the most frequent criticism of the epistemicist's view: intuitively speaking it's simply extremely implausible. In the case at hand, to claim that at some threshold b, if our credence for a given proposition p is equivalent to b, we ought to believe that p, whereas if our credence is even infinitesimally lower than b, we ought to suspend judgment about p, just seems wrong. However, this implausibility is

[18] Ted Shear and Branden Fitelson, "Two Approaches to Belief Revision," *Erkenntnis* 84, no. 3 (August 2018), p. 490.

compounded by the normative nature of the Straightforward Reduction, as it is not an attempt to provide a merely descriptive account of the relation between belief and credence, but rather a normative account thereof. That is to say, the Straightforward Reduction concerns the normative aspect of belief—whether we *ought* to believe, disbelieve, or suspend judgment about a given proposition. Descriptive facts about the world are admittedly often arbitrary; the fact that in Missouri, possessing 1.23 grams of marijuana is merely a misdemeanor, whereas possessing 1.24 grams is a felony, is arbitrary. Here, this arbitrariness is rooted in the fact that drug possession laws are established by human lawmakers, for whom it is practically useful to establish a sharp cut-off between non-felony and felony offenses. However, for a normative fact to be arbitrary would be quite odd indeed; if, for instance, a moral realist were to posit that moral imperatives were merely arbitrary, this would count significantly against her view. Yet positing such an arbitrary cut-off seems to be the option to which the epistemicist about belief and credence is consigned, for we have already exhausted the candidates for non-arbitrary, knowable belief thresholds. Thus, the fact that the Straightforward Reduction is meant to be a normative account of the relation between belief and credence constitutes further evidence against the existence of an arbitrary, unknowable credence threshold dictating which doxastic attitude we ought to take towards a proposition *p*.

Consequently, we now have good reason to accept both of the following claims: first, that there is not a knowable credence threshold available to the Straightforward Reductionist, and second, that any unknowable threshold will be arbitrary and therefore at odds with the normative nature of the Straightforward Reduction. The upshot is that we have good reason to reject the Straightforward Reduction on the whole, for it requires that there be a sharp threshold, b, such that we ought to believe only those propositions whose credence $c(p) \geq b$, yet it's dubious that such a threshold exists, regardless of whether it is knowable or not. In what follows, I make the tentative proposal that, despite the issues arising from my sorites argument, the general spirit of the Straightforward Reduction may yet be salvaged. To do so I offer one potential account, the Vague Reduction, which can better withstand soritical criticism and allows us to retain the taxonomies of both traditional and formal epistemology.

2.5 *A Modest Proposal Forward: The Vague Reduction*

Before going further, let's briefly take stock: in § 2.1, I identified one potential view of the relation between rational belief and credence, the Straightforward Reduction, according to which the former depends solely on the latter. Thereafter in §§ 2.2 and 2.3, I considered Friedman's argument against this view, which attempted to show that the rational permissibility of suspending judgment about certain independent conjunctions requires us to equate belief with a credence of 1 and disbelief with a credence of 0. Finding her reasoning faulty, I constructed a sorites argument in § 2.4 which offers an alternate route to Friedman's conclusion. So, having good reason to reject the Straightforward Reduction, we are left unsure of the relation between rational belief and credence, as well as of the relation between the taxonomies of traditional and formal epistemology more generally.

Now recall one of the solutions to the sorites paradox mentioned in § 2.4, *viz*. to claim that, for some n grains of wheat, it is neither definitely true nor definitely false that the n grains constitute a heap. With respect to my argument, I previously dismissed such responses as incompatible with the Straightforward Reduction; however, having now argued that the Straightforward Reduction is false, I can entertain an analogous solution to the argument. Specifically, I plan to propose that, with regard to propositions with borderline credences, it is simply vague what our corresponding doxastic attitude ought to be. Thus, for a proposition p with a borderline credence, it is neither definitely true nor definitely false that we ought to believe that p.

As is common among such responses to sorites paradoxes, I intend to utilize a supervaluational semantics to formalize this claim. In short, supervaluationism assigns such claims as "S ought to believe that p if $c(p) = x$" a truth-value, y, such that $0 \leq y \leq 1$. This truth-value is determined by evaluating the many disparate precisifications of these claims, i.e. the disparate interpretations under which the claim is either definitely true or definitely false, and calculating the proportion of precisifications under which a given claim is definitely true; claims which are true under all precisifications are deemed super-true and assigned a truth-value of 1, whereas claims which are false under all precisifications are deemed super-false and assigned a truth-value of 0. For instance, the claim that "S ought to believe that p if $c(p) = 1$" is presumably true under all precisifications, and therefore ought to be assigned a truth-value of 1.

By adopting this supervaluational semantics, we can formalize our new Vague Reduction as follows: for values $w, x, y,$ and z, such that each value lies within the interval [0, 1] and $w < x < y < z$, we epistemically ought to believe a proposition p when $c(p) \geq z$, disbelieve p when $c(p) \leq w$, and suspend judgment about p when $x \leq c(p) \leq y$. Moreover, it is vague whether we ought to believe p or suspend judgment about p when $y < c(p) < z$, as well as whether we ought to disbelieve p or suspend judgment about p when $w < c(p) < x$. Unlike the Straightforward Reduction, the Vague

Reduction is able to neatly circumvent soritical criticism by disavowing the notion of sharp thresholds which govern the three traditional doxastic attitudes. Furthermore, the Vague Reduction seems better aligned with our intuitions, as there are cases in which it is entirely unclear which doxastic response to a proposition is justified by our evidence.

Having thus argued that the Vague Reduction, coupled with a supervaluational semantics, is superior to its predecessor, I treat it as the official representative of the reductionist camp going forward. In the following chapters, then, I consider objections to the Vague Reduction similar to those which have been leveled against the Straightforward Reduction; these include arguments formed on the basis of the Lottery Paradox, the Preface Paradox, and the slightly-newer Blue Bus Case, to name a few. Although my subsequent responses to these objections serve first and foremost to defend the Vague Reduction from potential criticisms, they will likewise prove to vindicate the Straightforward Reduction from many of the arguments which have been made against it. As such, those not convinced that the Vague Reduction ought to supplant the Straightforward Reduction can simply view the arguments of chapters three and four as a defense of the Straightforward Reduction if they so desire.

CHAPTER THREE

Discarding Dualist Objections

3.1 *Introductory Remarks*

In the following chapter, I consider prominent dualist objections to the Straightforward Reduction alluded to in chapter two. Given the similarity between the Straightforward Reduction and my proposed account, the Vague Reduction, these prove to likewise be objections to the Vague Reduction. These objections fall into two broad classes: the first class, consisting of arguments formed on the basis of the Lottery and the Preface Paradox, utilizes the conjunction principle to argue against any variant of the threshold view (whether sharp or vague) relating rational belief and credence. The second class, consisting of arguments formed on the basis of the Blue Bus Case, offers us intuitive reason for thinking that a credence $c(p)$ cannot give rise to epistemically licensed belief if formed on the basis of statistical evidence alone; such arguments likewise purport to refute all stripes of the Lockean thesis about belief and credence. Both classes of arguments, however, have the following in common: they purport to establish normative dualism, i.e. the thesis that $c(p)$ does not alone determine whether belief that p is epistemically rational. Thus, by subsequently addressing these objections in turn, and arguing that they do not constitute a decisive blow to the Vague Reduction, I likewise undermine the case for dualism.

3.2 *The Lottery Paradox and the Preface Paradox*

The Lottery Paradox is well-known in the literature, and arises within the following context: suppose a lottery which will have only one winner is held, and 100 tickets are sold, each one equally likely to win. Let t_1 be the proposition that the first ticket will win, t_2 the proposition that the second one will win, and so on until t_{100}. As I've noted, each ticket has the same probability of winning, namely 0.01. An interesting question, then, is what our doxastic attitude with respect to each individual proposition in the set $(t_1, t_2, \ldots, t_{100})$ ought to be—it seems to me that disbelief is the most intuitive response.[1] However, let's first consider the other possible option, suspension of judgment. If we are inclined to suspend judgment about each proposition t_1 through t_{100} without forsaking the Vague Reduction, we must claim that disbelief here is a matter of assigning a proposition a credence $c(p)$ such that $0 \leq c(p) < 0.01$. This reasoning seems valid for larger lotteries as well, ones consisting of thousands or even millions of tickets, and as the quantity of tickets sold increases, the credence-threshold identified with disbelief shrinks proportionately. The consequence of this is that disbelief can only be equated with a credence of 0, as the size of the lottery can be extended such that, for all other intervals, the proposition that a given ticket has won lies in the interval, and so must be disbelieved.

[1] Interestingly, though, intuitions are fairly varied regarding this example, with many claiming that it seems suspension of judgment seems most appropriate. This does make some sense—as Staffel (2015) notes, if you can rationally believe your ticket will lose, why buy it? However, it doesn't make much difference which response to the hypothetical we adopt, as both come at a significant cost to the Lockean when later coupled with the conjunction principle.

So it looks as if Friedman's earlier claim that Straightforward Reductionists must identify disbelief with a credence of 0 is correct if we're permitted to suspend judgment about individual propositions t_1 through t_n, where *n* is a finite number.[2] But what of the other response, which maintains that we can in fact disbelieve lottery propositions? Let's imagine that I have purchased the first ticket, and therefore t_1 is the proposition that my ticket will win the lottery; if we can disbelieve lottery propositions, then we can disbelieve t_1. Recall that, in § 2.2, disbelieving p was declared tantamount to believing $\neg p$. In this case, that means disbelieving t_1 is a matter of believing $\neg t_1$, the proposition that my ticket will lose. This logic seems equally applicable to individual propositions t_2 through t_{100}, as there's nothing statistically relevant to t_1 representing my ticket as opposed to someone else's. Thus we can believe all individual propositions within the set $(\neg t_1, \neg\, t_2, \ldots, \neg\, t_{100})$. As Buchak notes, though, the conjunction principle dictates that "one ought to believe the conjunction of what one believes."[3] This seems a plausible enough assertion at first blush; if, for instance, I believe both that it will be sunny tomorrow, and that it will be humid tomorrow, then it seems I ought to believe it will be sunny and humid tomorrow. However, if true, the conjunction principle entails belief in the conjunction $(\neg t_1 \wedge \neg\, t_2 \ \wedge \ldots \wedge \neg\, t_{100})$, that all of the 100 tickets will lose. But we know this is false—after all, a lottery with no winning ticket wouldn't be much of a lottery. As such, it would initially appear that we cannot disbelieve these lottery propositions, as doing so requires us to hold contradictory beliefs.

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[2] Moreover, we can invert the propositions such that t_1 is the proposition that the first ticket will lose, and so on, eventually yielding a parallel result with regard to belief, namely that it must be identified with a credence of 1.

[3] Buchak, "Belief, Credence, and Norms," 289.

This leaves us back where we began, suspending judgment about lottery propositions. Yet, as we've already seen, allowing for suspension of judgment with regard to lottery propositions leads directly to the Certainty View which was previously dismissed, according to which rational disbelief requires a credence of 0 and rational belief a credence of 1. Moreover, while this conclusion does not contradict the Straightforward Reduction *per se*, it would in fact contradict its revised counterpart, the Vague Reduction. For suppose that we ought to suspend judgment about lottery propositions, and thus are only licensed to believe a proposition p when $c(p) = 1$, and disbelieve p when $c(p) = 0$; this would entail a collapse from the Vague Reduction into its predecessor, the Straightforward Reduction, as it leaves no room for the vagueness characteristic of the Vague Reduction.

Before critiquing the Lottery Paradox, however, I want to briefly turn to another paradox which is structurally similar to it, namely the Preface Paradox.[4] The Preface Paradox invites us to consider hypotheticals of the following sort: suppose we consider a meticulous historian, Joseph, who has just published his *magnus opum*, 500 Fun Historical Facts. As the title might suggest, Joseph's work is composed of 500 novel historical facts, each of which our scrupulous historian has researched thoroughly prior to publication. Suppose Joseph considers each individual proposition $p_1, p_2, \ldots, p_{500}$, where p_1 is the proposition that the first fact is true, p_2 is the proposition that the second fact is true, and so on until p_{500}, the proposition that the 500th fact is true. Suppose moreover that, having thoroughly researched each of these facts, Joseph is epistemically justified in having outright belief in each of the propositions p_1 though p_{500}. Now, recall

[4] For further discussion of the Preface Paradox, see Ryan (1991).

that the conjunction principle posits that rational belief is closed under conjunction, and so Joseph ought not only believe each individual proposition in the set $(p_1, p_2 \ldots p_{500})$, but likewise the conjunction $(p_1 \wedge\ p_2 \wedge \ldots \wedge p_{500})$.

In spite of his scrupulous research, however, Joseph remains a fallible agent, and a self-aware one at that: he occasionally makes mistakes, and consequently assigns each respective proposition p_1 though p_{500} a credence $c(p_n)$ which is less than 1 for all n. For the sake of simplicity, let's suppose that Joseph is equally confident in the veracity of each fact, and on the basis of past experience he assigns each proposition a credence of 0.99. Moreover, once again for the sake of simplicity, let's suppose that propositions p_1 though p_{500} are probabilistically independent. These assumptions, however, prove troublesome for the Vague Reduction when taken alongside the conjunction principle. Given probabilistic independence, the likelihood that $(p_1 \wedge\ p_2 \wedge \ldots \wedge p_{500})$ is true is equivalent to $[c(p_1) * c(p_2) * \ldots * c(p_{500})] = (0.99)^{500} \approx .007$. This, however, places the Vague Reduction in an undesirable position—if we adopt the conjunction principle, then we must claim that our threshold above which it is super-true that we ought to believe that p is true, $z < .007$. Of course, similar reasoning would apply to even larger texts—say, 10,000 Fun Historical Facts—and thus the amount of facts can be increased until z, our super-true belief threshold from § 2.5, can only be identified with 0. It goes without saying that this will not do; the upshot would be that we ought to believe all propositions, which is quite at odds with the Vague Reduction. A response is therefore in order if we are to retain any semblance of the Lockean thesis, be it the Straightforward Reduction, the Vague Reduction, or any other account in the Lockean family tree.

Before providing one, however, it's worth noting that both the Lottery and Preface Paradox likewise serve as arguments in support of normative non-reductionism. For in both instances, the conjunction principle, along with the claim that we ought to believe lottery propositions, entails that there is no non-zero threshold below which belief is epistemically irrational; thus, assuming the Certainty View is false, both instances would seem to refute any standard threshold view. Moreover, given that both cases rely on the claim that one ought to believe the conjunction of lottery propositions, they are clearly non-eliminativist; the eliminativist, in contrast, would maintain that we ought not belief lottery propositions nor the conjunctions thereof. These cases therefore lend support to dualism, as they are incompatible with both eliminativism and threshold views. As such, in subsequently arguing against the conjunction principle, I undermine not only the negative argument against the Vague Reduction, but also the positive argument for non-reductionism.

3.3 *An Argument Against the Conjunction Principle*

Much of the success of both the Lottery Paradox and the Preface Paradox in refuting the Vague Reduction turns on the veracity of the conjunction principle; if rational, outright belief is indeed closed under conjunction, the prospects for a reduction from traditional to formal epistemology are dim.[5] Accordingly, I have incurred a substantial debt—I must at the very least cast doubt on the conjunction principle, or better yet illustrate that it is altogether false. If my subsequent attempt to do so should

[5] Leitgeb's (2014) Stability Theory of Belief, though not a standard threshold view, offers one potential formal account which does not disavow the conjunction principle. Views such as mine, however, cannot accommodate the conjunction principle within their framework, hence the need for an argument against it if the Vague Reduction is to remain on the table.

prove successful, the upshot will be that the Lottery and Preface Paradox will be jointly undermined, leaving the Vague Reduction unscathed and non-reductionism partially unmotivated.

I should first note that I am in deep sympathy with Swain's quip that "it is difficult to give an argument against the conjunction principle, partly because it is so obvious to me that it is false, and partly because it is so obvious to certain other people that it is true."[6] As for myself, I prefer a characteristically Moorean response: within the Lottery Paradox, for instance, it is rational to believe that each individual ticket will lose while likewise holding that some ticket will win, so the conjunction principle is false.[7] "One man's *modus ponens* is another man's *modus tollens*," the saying goes. In the case at hand, however, I suspect such a response would be too quick; indeed, the multitude of philosophers who adhere to the conjunction principle suggests that my intuitions are far from universally shared, making a Moorean response unlikely to be compelling.[8] As such, we must look elsewhere for another argument against the conjunction principle.

To construct a separate argument against the conjunction principle, I intend to take the following claim on board: there is some non-zero y such that, when our total available evidence warrants a credence in a given proposition p below y, it is epistemically irrational to believe that p. Put more formally: there exists some $y \in (0,1]$ such that, when $c(p) < y$, belief that p is never epistemically rational. That is not to say

[6] Marshall Swain, "Induction, Acceptance, and Rational Belief," (Dordrecht, Netherlands: Reidel, 1970, 77.

[7] I refer, of course, to the Moorean shift famously introduced by G.E. Moore in his (1925) essay, "A Defence of Common Sense."

[8] Adherents of the conjunction principle include Leitgeb (2014), Staffel (2015), and Nelkin (2000).

that we ought to disbelieve p, nor that we ought to suspend judgment about p when $c(p) < y$, but merely that we ought not believe that p.[9] For the sake of concision, let's call this premise the Principle of Non-Belief. The Principle of Non-Belief seems to me difficult to deny. For suppose that the Principle of Non-Belief is false; this, coupled with the incontrovertible premise that there are some propositions which we ought not believe, would entail that our credence in some propositions which we ought not believe must equal 0.[10] And presumably this is too permissive—to maintain that there are propositions which it is epistemically rational to believe, despite assigning these propositions infinitesimally-low credences and thus being all-but entirely certain of their falsehood, is altogether implausible.

Rather than offering further considerations which illustrate the absurdity of denying the Principle of Non-Belief, I will be resting my brief defense of it here. My comfort in doing so stems from the fact previously alluded to that the Principle of Non-Belief enjoys a great deal of intuitive support, so much so that its denial seems simply implausible. Lest we are to hold that there are certain propositions which it is epistemically rational to believe, despite its being more likely that my next Powerball ticket will win than that said propositions are true, we must accept the Principle of Non-Belief.[11]

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[9] The question of whether disbelief or suspension of judgment is the correct attitude to take towards p, on my account, will depend on where precisely in the interval $(0, 1)$ our credence, $c(p)$, lies.

[10] Denying this latter premise, i.e. denying that there are some propositions which we ought not believe, is absurd; although the Pyrrhonians may have once denied its inverse, and thus held that we are not justified in believing *any* propositions, to hold the view that we ought to believe *all* propositions is obviously false.

[11] The odds of winning the Powerball, when purchasing one ticket, are 1 in 292,201,338. If the Principle of Non-Belief is false, however, there will be at least one proposition p which I ought to believe, unless it is assigned a credence of zero; so, $c(p)$ could be infinitesimally low, far lower than the odds of winning the

Having thus taken the Principle of Non-Belief on board, let's consider a rational agent, Alvin, and more specifically, one possible set of probabilistically independent propositions which Alvin rationally believes, $(p_1, p_2 \ldots p_n)$, where n is some finite number. Suppose that, despite his rational belief in all propositions p_1 through p_n, Alvin is not absolutely certain of the veracity of any of the propositions in the set, and in turn assigns none of the propositions p_1 through p_n a credence of 1. Given our stipulation that the propositions p_1 through p_n are independent, the credence assigned the conjunction $(p_1 \wedge p_2 \wedge \ldots \wedge p_n)$ ought to equal $[c(p_1) * c(p_2) * \ldots * c(p_n)]$. As one last matter of stipulation, suppose that all credences $c(p_1)$ through $c(p_n)$ lie in the closed interval [.95, .99].[12]

Let's consider now one possible set composed of ten propositions; from the fact that $c(p_1)$ through $c(p_n)$ lies in $[.95, .99]$, it follows that $[c(p_1) * c(p_2) * \ldots * c(p_n)]$ lies in $[(.95^{10}), (.99^{10})] \approx [.60, .90]$. Thus, if we adhere to both the conjunction principle and the Principle of Non-Belief, we are compelled to conclude that y, the credence threshold below which we ought not believe a proposition p, lies in the interval $(0, .60)$. This conclusion, admittedly, is palatable enough. However, let's consider a larger possible set of propositions which Alvin rationally believes: one composed of 100 propositions, let's say. In this case, $[c(p_1) * c(p_2) * \ldots * c(p_n)]$ must lie in the interval $[(.95^{100}), (.99^{100})] \approx [.01, .37]$, meaning that the proponent of the conjunction principle and the Principle of Non-Belief must hold that $y < .01$. I take it my argumentative tack

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Powerball, yet if the Principle of Non-Belief is false, it follows that we ought to believe this proposition nonetheless.

[12] Though I use .95 and .99 as my lower and upper bounds, respectively, any two values which lie within the open interval $(0, 1)$ would suffice for the argument.

is becoming steadily more conspicuous—as we increase the quantity of propositions rationally believed by Alvin, $[c(p_1) * c(p_2) * \ldots * \ c(p_n)]$ decreases proportionately.

The upshot is that n, the number of propositions in our possible set, can always be extended such that that $c(p_1 \wedge \ p_2 \wedge \ldots \wedge p_n)$ lies in the interval $(0, y)$, where we ought not believe any proposition p when $c(p) < y$. [13] However, recall that the conjunction principle dictates that rational belief is closed under conjunction, i.e. we ought to believe the conjunction of our rational beliefs. Thus, if the conjunction principle is true, when considering a sufficiently large set of propositions, it follows that Alvin ought to believe a conjunction whose credence $c(p_1 \wedge \ p_2 \wedge \ldots \wedge p_n) < y$. Yet this conclusion violates the Principle of Non-Belief, as it requires belief that the conjunction $(p_1 \wedge \ p_2 \wedge \ldots \wedge p_n)$ is true, despite its warranting a credence below y. So, we are left with a *reductio ad absurdum* of the conjunction of the Principle of Non-Belief and the conjunction principle; in turn, either the Principle of Non-Belief or the conjunction principle is false, if not both. However, the Principle of Non-Belief is true, so the conjunction principle must be false.[14]

Upon reaching this juncture in the argument, it will doubtless be objected that my reasoning is question-begging; in arguing against the conjunction principle, which entails the falsity of the Lockean thesis about belief and credence, I have utilized a distinctly Lockean principle, *viz.* the Principle of Non-Belief. Thus my argument begs the

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[13] To put the point more formally: given that all credences $c(p_1)$ through $c(p_n)$ lie in the closed interval [.95, .99], as n approaches infinity, $c(p_1 \wedge \ p_2 \wedge \ldots \wedge p_n) \in [\lim_{n\to\infty}(.95)^n, \ \lim_{n\to\infty}(.99)^n] = [0,0]$. Thus, for any non-zero y, n can be extended such that $c(p_1 \wedge \ p_2 \wedge \ldots \wedge p_n) < y$, thereby violating the Principle of Non-Belief.

[14] My thanks to Alex Pruss for pointing out that the first iteration of this argument was mathematically flawed, leading to its current form.

question: in attempting to undermine an objection to the Lockean thesis, I have presupposed something strikingly similar to it—or so the objection may run. To be sure, this objection is not altogether unfounded, as the Principle of Non-Belief bears some resemblance to the generally Lockean account which I defend. My argument, however, is not question begging; on the contrary, one can consistently affirm the Principle of Non-Belief while flatly rejecting any variant of the Lockean thesis. Indeed, to affirm the Principle of Non-Belief, we need only to posit that there is *some* connection between outright belief and credence, which of course is not tantamount to positing a reduction from the former to the latter. The dualist about belief and credence, for instance, may hold that "we have both beliefs and credences and neither attitude is reducible to the other," while nonetheless adopting the Principle of Non-Belief in order to avoid wholly severing the connection between belief and credence.[15]

So, I want to tentatively conclude that my argument against the conjunction principle does not beg the question, for it does not presuppose any variant of the Lockean thesis. Having dismissed that potential objection to my argument, I should think that the conjunction principle has been demonstrated to be at least dubious, if not false. In turn, given that both the Lottery and Preface Paradox rely upon the conjunction principle, its downfall spells their own; the purported "paradoxes" they mean to make evident appear to be specious illusions. Admittedly, though, I'm rather pessimistic about my argument's capacity for convincing philosophers antecedently committed to the conjunction principle, who are doubtless aware that their commitments occasionally require belief in

[15] Elizabeth Jackson, "How Belief Credence Dualism Explains Away Pragmatic Encroachment," *The Philosophical Quarterly* (2019): 1.

propositions with infinitesimally low credences. The pivotal difference, of course, is that while I consider this good reason for rejecting the conjunction principle, those philosophers consider it good reason for rejecting the Lockean thesis.[16]

At any rate, discussion of the conjunction principle must eventually come to an end; suffice it to say that, assuming we are inclined to adopt the Principle of Non-Belief and thereby refrain from wholly severing the link between belief and credence, then we ought to jettison the conjunction principle. Moreover, by abandoning the conjunction principle, the arguments which the Lottery and Preface Paradox form for non-reductionism are made obsolete, as they likewise turn on the veracity of the conjunction principle. In the following section, I proceed beyond arguments which rely on the conjunction principle to consider cases which purport to offer intuitive reason for thinking that, in some instances, belief is not formally reducible to credence. These intuitions, I intend to argue, are misleading.

3.4 *The Blue Bus Case*

The Blue Bus Case is relatively well-known in the literature, and invites us to consider the following hypothetical: suppose an individual's car is hit by a bus late at night, and the only eyewitness cannot identify the bus company which the bus belonged to.[17] Now suppose further that it can be proven that 80 percent of the buses operating in that area on that particular night were from the Blue Bus Company, and the remaining 20 percent were from the Green Bus Company. Here, we ought to have a fairly high

[16] Unfortunately, given the limited scope of this thesis, I lack the requisite space to consider the arguments which have been offered on the behalf of the conjunction principle.

[17] This particular version of the Blue Bus Case is first presented by Schauer (2003).

credence that the Blue Bus Company was operating the bus which hit the car (namely 0.8), but many have the intuition that we ought not have outright belief that the Blue Bus Company is responsible, despite our relatively high credence.[18] This conclusion mirrors that of the legal system, with Buchak and Schauer noting that we could never convict the Blue Bus Company based on this pure statistical evidence alone. Indeed, the same conclusion holds even if, say, 90 or 95 percent of the buses in the area were operated by the Blue Bus Company; upon reflection, it might seem that we ought not have unqualified belief that the bus belonged to the Blue Bus Company. Buchak puts the point rather strongly: "it seems clear that when we reflect on all evidence available . . . and reflect on what we ought to believe, we don't have a clear (rational) belief about whether the Blue Bus hit the woman."[19]

However, consider a similar situation, where an eyewitness comes forth and claims that she saw the Blue Bus Company logo on the side of the bus which hit the car; let's say that we determine this witness to be approximately 80 percent reliable. Here, many find it more likely that rational, outright belief that the Blue Bus Company is responsible for hitting the car is in fact justified, despite the fact that your credence of 0.8 is the same as in the above case. For those concerned that 80 percent reliability is insufficient, then suppose the eyewitness were 90 or 95 percent reliable, warranting a credence of 0.9 or 0.95, respectively. As in the prior case, these intuitions about rational belief reflect those of legal verdicts, with Buchak observing that the Blue Bus Company

[18] See Buchak (2013) for further discussion of the Blue Bus Case.

[19] Buchak, "Belief, Credence, and Norms," 291.

could potentially be convicted in light of this testimony.[20] More importantly, though, it seems evident to many that, in cases with reliable testimonial evidence justifying the same credence as in the prior cases of mere statistical evidence, rational belief is (or could be) justified, although it couldn't in cases of mere statistical evidence.[21]

Assuming these intuitions about justified outright belief do in fact correspond with the legal precedent regarding convictions in such cases, then we are left with evidence against all variants of the Lockean thesis, including my Vague Reduction. I take it this is fairly obvious; if rational, outright belief can in fact be responsive to different forms of evidence, despite their justifying the same credence, that would entail the possibility of two cases both warranting credence $c(p)$, such that $c(p) \geq z$, where z is the super-true threshold for rational belief, yet only licensing rational outright belief in one of the cases. This, of course, contradicts the Vague Reduction, as it posits the existence of a super-true threshold z which applies to all cases, not merely some. Moreover, if correct, such intuitions would lend strong support to non-reductionism, as they would illustrate that one cannot determine whether belief that p is epistemically licensed from $c(p)$ alone.

I should also note that utilizing the Blue Bus Case to form an argument against the Straightforward Reduction enjoys a substantial advantage over the Lottery and Preface Paradox, for it does not require the conjunction principle to be true in order to be successful. By circumventing this premise, which is at best contentious, it becomes substantially more appealing and capable of convincing a wider audience. As such, a

[20] Ibid., 291.

[21] Among those who endorse the view that statistical evidence cannot alone offer sufficient grounds for outright belief are Nelkin (2000), Buchak (2014), and Staffel (2015).

response on my part is in order if we are to deem the intuitions prompted by the Blue Bus Case unfounded.[22]

3.5 *A Response (or two) to the Blue Bus Case*

First, I would like to reiterate the obvious: the argument formed by way of the Blue Bus Case rests entirely on intuitions concerning epistemically rational belief and when it is licensed. It seems to me that we ought to be wary to disregard all variants of the Lockean thesis on the basis of mere intuition about relatively contrived cases (i.e. cases which rarely arise by natural means). Moreover—and this should go without saying—utilizing the Blue Bus Case as an argument against a formal reduction from belief to credence will hold little sway with those who do not share the same intuitions. To this group, I must confess, I belong myself. The fact alone that intuitions regarding the Blue Bus Case are far from unanimous should illustrate that it does not constitute a decisive blow to the Lockean thesis. Nevertheless, many philosophers' intuitions lead them to consider the Blue Bus Case a strong (albeit perhaps not decisive) blow to the Lockean thesis, and to them I owe a further response.

One means of undermining the intuitions prompted by the Blue Bus Case is to suggest that they arise due to a misrepresentation of circumstances in our hypothetical. In order to pursue this route, recall the first iteration of the hypothetical, which considered

[22] Although my concern in this and the following section lies with the Blue Bus Case, I should note that other similar cases have been put forth which purportedly support the view that mere statistical evidence can license high credence in a proposition but is insufficient for rational belief; these include Smith's (2010) case of a computer screen whose background is blue 999,999 times out of 1,000,000. In this instance, Smith suggests someone who does not presently see the screen is epistemically unjustified in believing it to be blue.

witness testimony deemed 80 percent reliable (i.e. warranting a credence of 0.8).[23] I noted beforehand that, according to proponents of the Blue Bus Case, belief in the veracity of the testimony seems likely to be epistemically licensed here, while it does not when our credence of 0.8 is based on mere statistical evidence. However, I suspect that witness testimony, particularly regarding something relatively clear-cut (e.g. whether the culpable bus belonged to the Blue Bus Company), will in all likelihood justify a credence $c(p) > .8$, given the straightforward nature of the crime. Suppose, for example, that you clearly witnessed a crime committed by an individual wearing a shirt, and are immediately asked whether said shirt was blue or yellow; in this instance, I submit that you will be above 80 percent sure of your answer under normal circumstances. Likewise, witness testimony that the Blue Bus Company was the guilty party, it seems, ought to generate a credence greater than .8 in the proposition that the Blue Bus Company is guilty—if the testimony did in fact warrant a credence of .8, this would appear indicative of some extenuating circumstance, e.g. that the crime was witnessed at night, or in conditions of low visibility, or by an individual with poor eyesight. And if there were in fact such a circumstance, then it seems at least plausible that outright belief in the Blue Bus Company's liability is not epistemically licensed.

Now, let's turn to cases in which witness testimony is not marred by such circumstances; on the contrary, suppose a witness of impeccable eyesight observes the crime in broad daylight from nearby, and testifies that a bus from the Blue Bus Company was responsible. Let's stipulate that this evidence warrants a credence $c(p) = .99$ in the

[23] It is an interesting question, though one I won't pursue, what exactly is meant by deeming a witness *x* percent reliable. For the sake of convenience, I simply stipulate that this is identical with our deeming her testimony *x* percent likely to be true.

Blue Bus Company's guilt. Here, I am entirely happy to grant that outright belief that the Blue Bus Company is culpable for the crime is epistemically rational. Thus far, then, I am in agreement with the advocate of the Blue Bus Case that this particular form of testimonial evidence ought to give rise to rational belief that the Blue Bus Company is guilty. However, let's consider her second claim, *viz*. that, if we have statistical evidence warranting a credence of .99 that the Blue Bus Company is guilty, we ought not have outright belief. Suppose, for instance, we learn that of the 100 buses in operation the day of the crime, 99 belonged to the Blue Bus Company, while the remaining one belonged to a lone driver of the Green Bus Company. Why does this not constitute sufficient evidence for generating rational belief in the Blue Bus Company's guilt?

In short, I doubt that this question has an answer, as the claim that statistical evidence is not epistemically sufficient for rational belief is at least unfounded. To see why this is the case, let's briefly consider the following principle invoked in defense of the claim that, in the above case, our evidence does not license outright belief, *viz*. the Principle of Mere Statistical Evidence (or PSE for short). The PSE says just this: it is epistemically irrational to form outright belief that p on the basis of statistical evidence alone for p.[24] If the PSE is true, it provides a convenient explanation for the intuition shared by many philosophers that we ought not believe the Blue Bus Company to be guilty based on statistical evidence alone, even when it warrants a credence $c(p) \geq .99$.

Aside from the Blue Bus Case, however, adherence to the PSE is strongly motivated by an adherence to the conjunction principle, for it offers a neat solution to the Lottery Paradox, namely that we ought not believe lottery propositions and so are not in

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[24] See footnote 21 for a list of several philosophers who adhere to the PSE.

danger of holding contradictory beliefs, even granting the conjunction principle. Yet, as I argued in § 3.3, we have good reason to doubt the conjunction principle, if not reject it altogether; though this of course does not refute the PSE, it does undermine the primary motivation for adopting it in the first place. Thus, in the case at hand, we lack independent motivation for holding that outright belief on the basis of mere statistical evidence is epistemically irrational. In turn, we are simply left with warring intuitions between those who maintain that mere statistical evidence warranting a credence of .99 is sufficient for rational belief, and those who maintain that that mere statistical evidence warranting a credence of .99 is not sufficient for rational belief.

Given that the principle invoked in support of the latter set of intuitions has been undermined, it seems that we ought not offer them our unabated assent. On the contrary, having suggested that the foundation on which these intuitions rest (i.e. the PSE) is tenuous, they ought not constitute much beyond weak evidence against the Vague Reduction. To be sure, my intention was not to offer an argument against the PSE, but rather suggest that it lacks independent support, and thereby discredit the intuitions of some philosophers in response to the Blue Bus Case. There will doubtless be those who nonetheless have these intuitions, but to them I would advise a healthy degree of caution; to discard all iterations of the Lockean thesis on the basis of intuitions which, I submit, lack a firm foundation, seems to me an imprudent decision. Assuming my advice is heeded, the Blue Bus Case ought not eliminate the Vague Reduction from contention as a possible account of the relation between rational belief and credence. Likewise, treating the Blue Bus Case as a decisive argument for dualism seems imprudent for precisely the same reason that it is imprudent to treat it as a decisive blow to threshold views, as the intuitions underlying both claims would appear to be groundless.

3.6 *Concluding Remarks*

In §§ 3.2 through 3.5, I considered the leading dualist objections to variants of the Lockean thesis about belief and credence, which includes my proposed Vague Reduction, and argued that they fail to constitute a decisive blow. As for the Lottery and Preface Paradox, I have suggested that the pivotal principle undergirding both arguments, i.e. the conjunction principle, is at best dubious; these purported paradoxes thus dissolve into mere illusions. As for the Blue Bus Case, I took a more defensive stance, suggesting that the intuitions which it prompts some philosophers to have are unfounded, and that at any rate it ought not be considered anything beyond weak evidence against the Vague Reduction. Moreover, I suggested that the foundation of the PSE, which is often cited in support of these intuitions, is at least unstable.

The upshot is two-fold: first, the Vague Reduction emerges from these supposed objections unscathed, and remains a live option for a formal reduction from belief to credence. Second, and equally important, the arguments for dualism which have been formed from the paradoxes of § 3.2, as well as those which have been formed from the Blue Bus Case of § 3.4, appear to be tenuous, leaving the cumulative case for dualism in poor shape.[25]

[25] It is important to note, though, that my arguments are not meant to refute non-reductionism, but rather suggest that it is largely unmotivated. To be sure, there are arguments in support of non-reductionism beyond those of §§ 3.2 and 3.4, yet these are perhaps the most-cited arguments in its favor, and so by undermining them, I have substantially undermined the case for dualism itself.

CHAPTER FOUR

Eliminating Eliminativism

4.1 *Introductory Remarks*

Lurking ominously in the background thus far has been the challenge alluded to in chapter one, i.e. that of the eliminativist about rational belief. The eliminativist offers a solution to the multitude of objections to reductionism whose allure cannot be denied, namely that such objections are altogether unnecessary in the first place. Why altogether unnecessary? In short, because by the eliminativist's lights, the relation between belief and credence is far simpler than we have supposed, as the former is deemed superfluous and therefore irrational. Indeed, she will say, upon determining $c(p)$, there is nothing which remains to be said about our doxastic attitude towards a given proposition, and so we have no more need to bother with the antiquated notion of outright belief, save perhaps as a convenient heuristic.

In other philosophical subfields, perhaps most notably philosophy of mind, eliminativism in its many stripes is often met with scoffs and incredulity, and is consequently cast away as implausible; such a response here, however, would be at the very least too hasty. For the question raised by the eliminativist is far from trivial; she asks, as Richard Foley conveys, "what reasons do we have to be interested in a theory of rational belief if we have an adequate theory of rational degrees of belief? Does the former tell us anything useful above and beyond the latter? Is it really needed for anything?"[1] This set of questions prompts the challenge issued by the eliminativist, and at the risk of sounding excessively grandiose, let's call this the Challenge.[2] The Challenge is namely this: to find a role for rational belief which cannot be fulfilled by credence alone. If eliminativism is true, the Challenge is unanswerable; thus, my primary aim going forward is to answer the Challenge, and to thereby eliminate eliminativism from contention.

Two caveats before going forward. First, though I stressed this point previously in chapter one, I should reiterate that the eliminativism with which I am concerned is normative in nature: it claims that we have no need for the notion of epistemically rational belief, as credence is capable of subsuming it. Unlike descriptive eliminativism, however, it sets aside the question of whether there is such a thing as outright belief; while the descriptive eliminativist will insist that the answer is no, and all of our talk of belief is in fact talk of credence, the normative eliminativist refrains from answering one way or another. Second, although I intend in this chapter to find *some* role for rational belief for which credence is unsuitable, I do not intend to find *the* role which rational belief has to play in our doxastic lives, as other more ambitious accounts have sought to do.[3] While I hope our subsequent investigations will shed some light on the proper

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[1] Richard Foley, "The Epistemology of Belief and the Epistemology of Degrees of Belief," *American Philosophical Quarterly* 29, no. 2 (1992): 114. Foley's account, I should note, is Lockean in nature, and therefore non-eliminativist; he thinks that the (rational) doxastic attitudes of traditional epistemology cannot so easily be abandoned.

[2] As philosophers are often chided for exceeding their allotted use of ungrammatical capital letters, I hope this particular usage will not be held against me.

[3] Other such accounts include that of Ross and Schroeder (2012), as well as Kaplan (1996), though the latter replaces belief with the ostensibly more coherent notion of assertion.

function of rational belief in our doxastic lives, the entire part which it has to play will doubtless remain unclear.

My plan for the remainder of the chapter is as follows: first, in § 4.2, I introduce and explicate a recent argument made by Buchak against eliminativism, which purports to find a role for rational belief within our norms governing blame that cannot be fulfilled by credence alone. This argument, I suggest, is sound, and therefore illustrates that eliminativism is wanting as a theory of the relationship between rational belief and credence. Subsequently, in § 4.3, I demonstrate that the pith of Buchak's argument, which would appear to rest upon normative non-reductionism, is in fact entirely compatible with normative reductionism and so *a fortiori* the Vague Reduction. To conclude, in § 4.4 I consider further questions that may arise from Buchak's argument, and note possible avenues for future inquiry.

4.2 *Buchak's Argument Against Eliminativism*

Despite its complexity, I should think that Buchak's anti-eliminativist argument is sound; in other words, it answers the Challenge issued in § 4.1. Thus, my aim in this section is primarily to explicate the argument, and thereby illustrate how precisely it places the eliminativist in hot water.

Undergirding Buchak's argument is her initial observation that, on eliminativism, we must in principle be capable of rewriting all norms which seemingly involve rational belief as norms which in fact involve only credence.[4] For if this is not the case, then credence cannot do all the legwork formerly delegated to belief, which is the very claim

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[4] Buchak, *Belief, Credence, and Norms,* 298.

that eliminativism rests on. This observation seems beyond reproach, and so can be safely taken on board. In turn, should we discover a norm employing belief which cannot be revised to employ only credence, then that norm constitutes a forceful case against the eliminativist.

One such norm, Buchak suggests, deals with the reactive attitude of blame. When doled out justly, blame toward someone allows us to hold her accountable for an action which she has committed that she ought not have. I may, for instance, witness a friend shoplift clothes from a department store, and blame him accordingly; doing so allows me to hold him morally responsible for an act deemed immoral. Now, one feature of blame crucial to Buchak's argument is namely that "whether to blame or praise someone via the reactive attitudes is an all-or-nothing decision based, so it seems, on what I *believe* (or know) about the facts concerning her and her action."[5] To be sure, blame does come in varying degrees of strength which are contingent on the severity of the act committed, but the question itself of whether to blame someone yields only two responses: yes or no. You either blame or blame not; there is no middle way. The decision of whether to blame, moreover, seems to turn on whether we believe someone to have transgressed.

At this point, putative counterexamples to the claim that blame is an all-or-nothing attitude are bound to arise. Take the case of someone shoplifting from the department store—there may be some inclination to qualify your blame toward the shoplifter given the possibility of extenuating circumstances which make her action less blameworthy. To such situations Buchak offers the following response:

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[5] Ibid., 299.

> It might be that you blame her, but you have doubts about whether this is the right thing to do. Here, we might say that you believe she did something wrong, but have second-order doubts whether your belief is correct. Thus, you apply the norm, but doubt whether your application is correct.[6]

Your blame thus remains unqualified, and any apparent hesitation results from second-order doubts about your belief, without suggesting that the blame itself is partial. In short, you have decided to blame, but are unsure whether you have made the correct decision in doing so.

Another potential response, which Buchak does not consider, likewise remains open to us at this juncture, which says just this: tempered blame in these instances results from an uncertainty of the severity of the transgression. For recall that blame comes in degrees which are sensitive to the severity of the transgression; if I believed someone had mercilessly bullied a Kindergartener, I ought to blame her more so than if I believed she had committed a parking violation. In the case at hand, then, I may be undecided as to the severity of the transgression, as I am unsure whether the severity of shoplifting might be mitigated by some extenuating circumstance unbeknownst to me. This uncertainty might explain the appearance of partial blame, as I am in fact unsure whether to blame in accordance with the more severe transgression (shoplifting indiscriminately) or with the less severe transgression (shoplifting under some extenuating circumstance). Taking this route similarly allows for us to discard such apparent counterexamples to the claim that blame is an all-or-nothing attitude.

Having effectively addressed this potential counterexample, Buchak's claim that blame operates in binary fashion seems quite plausible, and so I intend to take it on

[6] Ibid., 300.

board. Thus, we can now formalize the norm associated with blame. It says just this: "Blame someone if and only if you believe (or know) that she transgressed, and blame her in proportion to the severity of the transgression."[7] A corollary of the blame norm, which seems palatable enough, is that we ought not blame someone if we do not believe that she has transgressed. Indeed, even if we suspect that someone might well have transgressed, yet lack outright belief that she did, the blame norm dictates that we ought to withhold blame. Now, recall Buchak's initial observation upon which her subsequent argument rests, *viz*. that the eliminativist about rational belief must be capable of reformulating any norms making mention of belief such that they mention only credence. How might such a reformulation of the norm at hand look?

To take a pass at answering this question, it might prove helpful to first consider the realm in which the notion of credence arose: decision theory. Decision theory, in its incipient iteration, is indebted to Pascal, who, in correspondence with Fermat about how best to resolve a gambling game which ended prematurely, proposed that players be awarded the expected monetary value depending on their position at the game's conclusion.[8] This proposal led to the more general dictum that, in monetary betting contexts, a practically rational agent ought to perform the action which yields the highest expected monetary value.[9] Passing over the historical modifications which molded decision theory into its current form—expected utility (EU) theory—traditional EU

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[7] Ibid., 299.

[8] Blaise Pascal and Pierre Fermat, "Letters, collected as 'Fermat and Pascal on Probability," trans. Vera Sanford (New York: McGraw-Hill, 1929).

[9] Buchak, "Decision Theory," *Oxford Handbooks Online*, (2017).

theory now holds that a practically rational agent ought to perform the action which yields the highest expected subjective utility. Put more formally: when choosing from acts $a_1 - a_n$, given possible outcomes $O_1 - O_n$, where each act is of the form $a = \{O_1, u_1 | O_2, u_2 | \dots | O_n, u_n\}$ and an act a yields utility u_i if outcome O_i obtains, perform the act whose $EU(a) = \sum_{i=1}^{n} p(O_i) * u_i$ is highest.[10]

Decision theory has proven extremely effective at providing injunctions as to which action an agent ought to perform, even outside of the betting context for which it was originally devised. In the task at hand, then, coupling credences with some variant of decision theory would seem the natural avenue for the eliminativist to take in her attempt to rewrite the blame norm.

So, let us consider one such potential reformulation of the blame norm, which Buchak describes thus: "Blame someone in accordance with the expectation of how severely she transgressed, given your credence that she transgressed and the severity of the transgression."[11] This seems, at first blush, a natural "translation" of the original blame norm into a credence-only norm: depending on our credence that someone transgressed and the severity of transgression, we can dole out blame in a manner commensurate with the expected blame that she ought to receive. But this reformulation, as Buchak notes, leads to deeply counterintuitive results when applied. Suppose, for instance, that I have a credence of .95 that my brother swiped a chocolate bar from the gas station—assuming I likewise have outright belief that he stole the chocolate bar, I

[10] "Normative Theories of Rational Choice: Expected Utility," R. A. Briggs, Stanford Encyclopedia of Philosophy, https://plato.stanford.edu/entries/rationality-normative-utility/

[11] Buchak, "Belief, Credence, and Norms," 300.

ought to blame him some small amount for this slight transgression. On the other hand, suppose I have a credence of .05 that my brother embezzled $5,000 from the local children's hospital, and lack outright belief that he did so. In this instance, it seems I ought to withhold blame altogether, although the quantitative expectation of how much blame he ought to receive is higher in the latter case than in the former.

Further support that this initial revision of the blame norm stands at odds with our intuitive judgments can be found in the legal system. Thus Buchak:

> We could imagine a legal system that punishes defendants on the basis of some partial attitude the jury forms in her guilt: the defendant gets 2 years if the jury forms a credence (or partial verdict) of 0.9 in her guilt, 4 years if the jury forms a credence of .95, and so forth. Indeed, perhaps this system would maximize expected utility, when we take into account the value of punishing a guilty person and the disvalue of punishing an innocent person.[12]

In fact, though, we have not instituted such a system, and for good reason. Consider, for instance, defendants of more serious crimes such as first-degree murder, which (let's stipulate) ought to be sentenced to 100 years if a credence of 1 in their guilt is formed. Suppose the jury forms a credence of .05 in a defendant's guilt, coupled with full disbelief; even though the mathematical expectation of how many years she ought to receive is five years, it would seem unjust to sentence her to five years in prison for a murder we believe she did not commit.

Granted, punishing a defendant for a purported crime is not tantamount to blaming her for transgressing, but is nonetheless similar insofar as juries are meant to make an all-or-nothing determination of a defendant's guilt, much like in the case of blame. Even if we find the current legal system of all-or-nothing punishment flawed, it

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[12] Ibid., 301.

would seem the proposed system of maximizing expected punishment is likewise problematic.[13] Turning back to the blame norm, then, it would appear that our first pass at offering a belief-free revision thereof has failed—the principle that we ought to blame someone in accordance with the expected blame that they deserve is untenable.

Still, perhaps the eliminativist can do better than our first pass. Buchak thus considers a second, more nuanced revision of the blame norm, which purports to utilize only credence and decision theory to track our judgments about when we ought to blame. This new norm says just this:

> Blame someone, and blame her in proportion to the severity of the transgression, if blaming her has a higher expected moral utility than not blaming her, given your credence that she transgressed and the moral utility of blaming/not blaming a guilty person for that transgression and blaming/not blaming an innocent person for that transgression.[14]

This newly-revised norm enjoys two significant advantages over its predecessor: first, and most notably, it preserves the intuition that blame is an all-or-nothing endeavor, and in turn does away with the unpalatable notion of partial blame in cases where we have low, but non-zero, credence in an individual's guilt. Second, it tracks another factor not previously considered, *viz*. the disutility of blaming an innocent person for a transgression; this consideration features heavily into our legal system, which requires a high standard of proof for conviction to account for the high disutility of wrongly convicting someone.

This norm, however, also won't do. To see why, Buchak offers the following two cases. In the first case, you leave your phone in a room which only two strangers—Jake

[13] For more on the all-or-nothing nature of the legal system, and objections to it made by advocates of decision theory, see Nesson (1985).

[14] Ibid., 302.

and Joe—have a key to, and return to find your phone stolen. Suppose an eyewitness tells you she witnessed someone resembling Jake leave the phone with your room, generating a credence of .95 in Jake's guilt, along with outright belief. In this instance, our original blame norm dictates that you may rightly blame Jake for this transgression, and I submit correctly so. Now, let's modify the hypothetical: suppose in the second case, you similarly leave your phone in a room which only two strangers have access to, but now these strangers are Jake and Barbara. There is no eyewitness account, but you know that (let's say) men are 19 times more likely than women to steal phones. Supposing you have no additional evidence, then your credence here that Jake stole your phone ought to be the same as in the first case, namely .95. In this instance, Buchak suggests, and I agree with her, that you ought to withhold from blaming Jake for stealing your phone.

Why ought you not blame Jake in the latter case? A plausible principle which makes sense of this intuition is that you ought not blame someone solely on the basis that she belongs to a given reference class; similar cases abound with regard to race, sexual orientation, religion, and so forth.[15] Choosing to blame in such cases, Buchak notes, "harms . . . individuals that, through no fault of their own, belong to the wrong reference class."[16] However, note that the credence in Jake's guilt, along with the severity of the transgression, are the same in both instances. This creates a puzzle for the advocate of

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[15] That is, I ought not blame you for having shoplifted even if e.g. the vast majority of individuals in your reference class have shoplifted, assuming I have no evidence save your belonging to a given reference class. This strikes me as an extremely difficult assertion to deny.

[16] Ibid., 303.

our more nuanced revision of the blame norm, as it would appear that, if we are to blame in the first case, we ought to likewise blame in the second.

One potential escape route open to the eliminativist here is to claim that "wrongly [blaming] an individual on the basis of the reference class he belongs to . . . is worse than wrongly [blaming] an individual on the basis of eyewitness testimony."[17] In other words, the moral disutility of wrongly blaming someone due to the reference class she belongs to is greater than the moral disutility of blaming someone due to faulty eyewitness testimony. Thus, the adherent of the revised decision-theory variant of the blame norm may maintain that the reason why blame is licensed in the first case but not the second is owing to the higher expected moral disutility in the second case, where we run the risk of wrongly blaming someone on the basis of her reference class alone.

While this claim is certainly plausible, it cannot fully rid the eliminativist of her woes. For, assuming our misgivings about blaming someone on the basis of reference class alone are in fact due to the greater disutility of incorrectly doling out blame, "then this disutility can potentially be *outweighed*."[18] That is, if someone's belonging to a reference class alone can generate a sufficiently high credence in her guilt (e.g. if men are, let's say, 99 times more likely than women to steal, and so our credence that Jake is guilty is .99 in the second case), then there will be situations in which we nonetheless ought to blame someone on the basis of reference class alone. But this conclusion seems wrong: blaming someone for transgressing solely because they belong to a particular

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[17] Ibid. I have replaced "convicting" here with "blaming," but the essence of the response remains the same.

[18] Ibid.

reference class is not simply frowned upon, but rather forbidden.[19] This principle cannot be outweighed or overruled, regardless of the credence generated by reference class membership.

As a last-ditch effort, the eliminativist may be tempted here to embrace the claim that wrongly blaming someone based solely on the reference class she belongs to has infinite moral disutility. If this claim proves true, then our rewritten decision-theory variant of the blame norm will correctly dictate that we ought not blame on the basis of reference class alone, for the potential disutility of a false positive will swamp other considerations. Although this would resolve the issue at hand, the notion of infinite utility (or disutility) brings with it a score of problems which make this an unsavory option for the eliminativist.[20] For the sake of brevity I mention only one such issue, namely that infinite disutility makes expected-utility theory obsolete. Here's why: suppose some act (let's say, lying) yields infinite moral disutility. Now, among any possible set of acts, no act can make it absolutely certain that I will not, at some point, tell a lie. Thus, every act yields infinite expected disutility, for the infinite disutility of lying, multiplied by the non-zero probability of any act leading to my lying at some point,

[19] This claim is, admittedly, deontological in nature; it would appear that we have an obligation not to blame (or make other moral judgments) about individuals based on their reference class alone. This obligation allows us to condemn such evils as racism outright, and likewise allows us to deem repugnant any such claims in support of racist views or actions which appeal to the fact that members of certain reference groups are more likely to commit certain acts (e.g. stealing). Consequentialists have, therefore, less reason to assent to this claim, and so less reason to deem this variant of the blame norm unsuccessful. Unfortunately, detailed discussion on the merits of deontological ethics versus consequentialist ethics on this point is beyond the scope of this thesis, and so I will openly admit that this argument rests on a deontological claim which will be accepted by many, but not all.

[20] See Colyvan et al. (2010) for further discussion of the difficulties of mapping deontological claims onto standard decision theory, particularly when resorting to the notion of infinite utility.

results in an expected disutility of infinity.[21] Naturally, this makes expected-utility theory futile, as our every act yields infinite expected disutility—an unenviable position to be in to say the least.

As it was originally construed, then, the blame norm does not seem to lend itself to being rewritten with only credence and decision theory. The upshot is that the eliminativist about rational belief is in hot water; her claim that credence can do all of the legwork previously assigned to belief appears, with respect to the blame norm, to be mistaken.[22] We thus have good reason to deem eliminativism insufficient on the whole, as rational belief seems to have a distinct role to play in properly doling out blame (and I suspect other moral judgments) for which credence alone is unsuitable. In other words, the blame norm answers the Challenge presented in § 4.1.

In the following section, I flesh out some of the underlying implications of Buchak's argument, and demonstrate that, despite initial appearances to the contrary, commitment to her argument is in fact entirely compatible with the normative reduction I

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[21] Here is one example which demonstrates why this is the case. Suppose I am deciding whether to bowl, and the conditional probability that I will tell a lie, if I do go bowling, is .05 (perhaps I'm tempted to lie about my score), while the conditional probability that I will tell a lie, if I do not go bowling, is .2 (perhaps I'm tempted to lie to my friends about the reason for my absence). Since the act of lying yields infinite disutility, the expected disutility of choosing to bowl equals $(.05 * \infty) = \infty$, while the expected disutility of choosing not to bowl equals $(.2 * \infty) = \infty$, as any positive utility yielded by either act is swamped by the infinite disutility. Similar issues have given rise to the "mixed-strategies" objection to Pascal's Wager, which uses infinite utility in its original iteration; see Hájek (2003) for good discussion thereof.

[22] Although I choose not to discuss them in-depth, for the sake of brevity, I should briefly note two further responses open to the eliminativist considered by Buchak. The first is that standard expected-utility theory is somehow flawed; such a claim, while not untenable, is likely to be met with substantial resistance, given that expected-utility theory remains the reigning orthodoxy in decision theory. Moreover, the problem at hand seems not to lie with decision theory, but rather with the fact that credence alone is not sensitive to all the features which determine when we ought to blame. The second is to argue that the blame norm, as we currently apply it, is flawed. However, even if this proves true, it would not by itself vindicate the eliminativist without substantial revision of the blame norm; such revisions which are open to the eliminativist seem deeply deficient regardless. Thus, it is doubtful that the "correct" version of the blame norm (if indeed the original version is not correct) will itself be particularly accommodating to the eliminativist.

defend, and so my endorsement of her argument does not require me to forfeit my Lockean commitments.[23] To do so, I distinguish between two disparate types of norms governing belief, *viz*. epistemic and moral norms, and illustrate that Buchak's anti-eliminativist argument requires only that belief in someone's guilt on the basis of reference class alone be morally proscribed, rather than epistemically proscribed. Thereafter, I note that her argument does entail descriptive dualism, i.e. the thesis that outright belief that p is not simply identical to sufficiently high credence in p; this thesis, however, is likewise compatible with normative reductionism.

4.3 *Reconciling Buchak's Argument with Normative Reductionism*

Although it remains implicit in Buchak's argument against eliminativism, her commitment to non-reductionism undergirds her acceptance of the blame norm, as she holds that the question of whether we ought to believe, and thus to blame, is not merely contingent on credence. This non-reductionism, I should note, is normative in nature: it posits that one cannot tell from $c(p)$ alone whether belief that p is epistemically rational. One particular case which purportedly motivates this brand of dualism, namely the Blue Bus Case, was discussed in § 3.4, as Buchak and others suggested that mere statistical evidence alone cannot generate epistemically licensed belief. Likewise, partially motivating Buchak's claim that you ought not believe someone to have committed a transgression on the basis of reference class alone is that doing so involves forming a belief from mere statistical evidence.

[23] More specifically, I argue that descriptive dualism is compatible with any variant of classical threshold views, whether such thresholds are sharp (e.g. the Straightforward Reduction) or vague (e.g. the Vague Reduction).

As a dualist, such claims are good and well for Buchak to make, and ought not cause her any undue concern. For the reductionist, however, they might be considered a source of worry, as they appear at odds with her thesis relating rational belief and credence. For consider the view—which I explicitly endorsed—that we ought not believe Jake is guilty on the basis of his reference class alone, yet ought to believe in cases with sufficiently reliable testimony, even if the two generate the same credence in Joe's guilt; is this view not entirely incompatible with normative reductionism, and thus *a fortiori* the Vague Reduction?

The answer to this question is no. Put more explicitly, the following three premises are all compatible, despite appearances to the contrary:

(1) You ought to believe Jake is guilty (and so ought to blame him) if you have a credence of .95 in his guilt and that credence is formed on the basis of testimony.
(2) You ought not believe Jake is guilty (and so ought not blame him) if you have a credence of .95 in his guilt and that credence is formed on the basis of reference class alone.
(3) Whether belief that p (e.g. that Joe is guilty) is epistemically rational depends only on whether $c(p) \geq x$, where x is the threshold for epistemically rational belief.

That the conjunction of (1) and (2) does not alone entail the falsity of (3) becomes clear when we entertain the possibility that the reason why belief in Jake's guilt is prohibited in case two is not ultimately epistemic, but rather ethical. That is, the following claim is coherent: belief that Joe is guilty in case two is epistemically licensed, yet morally proscribed. Moreover, perhaps moral considerations outweigh epistemic considerations in this instance, and so on the whole you ought not believe that Jake is guilty, and therefore ought not blame him for having transgressed.

In simpler terms, case two presents us with a case of warring oughts; morally speaking, it seems we ought not believe Jake is guilty, yet epistemically speaking, we ought to believe he is. In the first case, however, the moral obligation to withhold belief is absent, and so the epistemic consideration takes precedent. To be sure, this signifies a slight departure from Buchak's rationale for endorsing (2), as she thinks that belief in Joe's guilt on the basis of his reference class alone is both epistemically and morally proscribed. Epistemically proscribed, because it involves believing a proposition on the basis of mere statistical evidence, and morally proscribed, because it involves deeming an individual guilty for circumstances he had no control over (among other reasons). In chapter three, I enumerated my reasons for deeming tenuous the principle that belief on the basis of mere statistical evidence is epistemically irrational, and I will not recount them here. At any rate, although my rationale for affirming (2) differs from Buchak's, it is nonetheless tenable.

Indeed, instances in which the "oughts" that govern belief compete with one another are far from unheard of. Consider, for example, the following hypothetical: you find yourself stranded on an island, and your odds of survival are quickly dwindling, as you cannot kindle a fire and have nothing to eat. From an epistemic perspective, belief that you will ultimately survive seems unlikely to be epistemically licensed; it is simply not supported by the evidence.[24] However, belief that you will survive may well be practically rational, as you are (let's suppose) more likely to persevere and shirk feelings of resignation and despair if you believe you will in fact survive, as opposed to believing you will not. Setting aside the question of whether you can voluntarily form the belief that you will survive, it certainly seems that you ought to if you can, for doing so may

[24] For the sake of argument, I am simply assuming that being "supported by the evidence," whatever that may mean, is a necessary condition of epistemically licensed belief.

increase your chance of survival. Thus, in the case at hand, it is no great objection to forming belief that it is epistemically irrational, as practical considerations seemingly trump epistemic considerations.[25]

Admittedly, this case is not completely analogous to the previous case of believing Jake to be guilty, as it presents conflict between practical and epistemic considerations, rather than conflict between moral and epistemic considerations. Nevertheless, I should think it illustrates that the dictums of epistemic rationality are occasionally subservient to other dictums (e.g. those of practical rationality, or of normative ethics). Pivoting back to belief that Joe is guilty on the basis of his reference class, then, it seems plausible that such belief is epistemically rational, yet ethically precluded, and further that the demands of ethics outweigh those of epistemic rationality. As such, we can say that we ought not believe Joe to be guilty in the first case, yet ought to believe him guilty in the second case, without forsaking the Vague Reduction, or any similar normative threshold view.

While commitment to premises (1) and (2), which underlie Buchak's argument against eliminativism, does not require us to abandon normative reductionism, it does have one intriguing implication: descriptive dualism. On descriptive dualism, what it actually *is* to have outright belief that *p* is not simply identical to having sufficiently high credence in *p*; outright belief that *p* is deemed an attitude beyond merely having some particular credence in *p*. This stands in contrast with normative dualism, which holds that

[25] Similar cases can be found in James' (1896) classic essay, "The Will to Believe." Moreover, such instances might be seen to at least undermine the principle defended in Clifford's (1877) essay, "The Ethics of Belief," where he claims that belief formed on the basis of insufficient evidence is always wrong. On this latter point though, I unfortunately have no room to dwell.

whether we epistemically *ought* to believe that p does not depend solely on one's credence in p.

The fact that premises (1) and (2) jointly entail descriptive dualism is not difficult to discern when they are coupled with the philosopher's maxim that "ought implies can." For, assuming that maxim is true, it follows from (1) that we can withhold belief in Joe's guilt on the basis of his reference class, and it follows from (2) that we can believe Joe to be guilty on the basis of testimonial evidence, although our evidence warrants the same credence in Joe's guilt in both cases.[26] Thus, it is possible that the same credence $c(p)$ gives rise to belief that p in one instance, yet does not give rise to belief that p in another. On descriptive reductionism, however, belief that p just *is* a matter of having a sufficiently high credence in p, making it impossible that the same credence $c(p)$ could give rise to belief in one instance and not in another. Hence, we are left with descriptive dualism.[27]

As I have already demonstrated that (1) and (2) are compatible with normative reductionism, it follows that descriptive dualism is likewise compatible with normative reductionism, for descriptive dualism is entailed by (1) and (2) themselves. Although my endorsement of (1) and (2) thus commits me to descriptive dualism, a full-fledged defense thereof lies beyond the scope of this thesis. Still, it's worth noting that those inclined to agree with the claim that we ought not believe someone to have committed a transgression due to reference class membership alone have reason to accept descriptive

[26] Another possibility, which I mention but choose not to entertain, is that the relevant maxim is false.

[27] The only other option, descriptive eliminativism (i.e. the thesis that in fact there are is no such thing as belief, and we have only credence) is ruled out by premise (2), which maintains that we ought to believe that Joe is guilty, and so (assuming ought implies can) we can believe that Joe is guilty.

dualism. Indeed, if Buchak is correct in her assertion, as I have suggested, then outright belief that p is in fact something beyond having sufficiently high credence in p; otherwise, we would be consigned to believe that Jake is guilty for no reason beyond his being a man in the second case above.

If my reasoning in this section has been successful, then Buchak's anti-eliminativist argument is in fact compatible with normative reductionism, despite its originally being written within the framework of normative dualism. Thus, one can consistently endorse the Vague Reduction, according to which belief that someone is guilty is epistemically rational if and only if $c(p)$ is sufficiently high, alongside Buchak's argument against eliminativism, according to which the determination of whether to believe that someone is guilty is sensitive to factors beyond $c(p)$ alone. Admittedly, doing so requires us to adopt descriptive dualism, according to which we cannot determine from $c(p)$ alone whether an agent does in fact believe that p, but I have suggested that this claim is at least plausible.

4.4 *Concluding Remarks*

In § 4.1, I professed my aim for this final substantive chapter: to find some role belonging to belief for which credence is unsuitable, and thereby argue that eliminativism is deficient as a normative theory relating outright belief and credence. One such role, it would appear, is to be found in the norm governing blame, as our failed attempts at offering a credence-only formulation of the blame norm suggest that belief has a role in properly doling out blame which is indispensable. Moreover, I have demonstrated that, by distinguishing between ethical and epistemic oughts, one can consistently deem Buchak's argument against eliminativism sound, which requires the view that credence alone cannot determine whether to blame someone for transgressing, without forsaking normative reductionism.

Nevertheless, other questions remain. For instance, although this argument purports to find rational belief indispensable with regard to blame, one might wonder whether the same can be said of rational belief in other contexts. What, for example, could be the purpose of rational belief in objective chance propositions which are removed from any moral judgments? Take the Lottery Paradox of chapter three: why not think that the notion of rational belief in lottery propositions can be done away with altogether, and supplanted by credence? In such cases, what is gained by granting rational belief a place in our doxastic lives?

Although such questions cannot be answered by the arguments of §§ 4.2 and 4.3, I do not find them unanswerable. Regretfully, though, they lie beyond the scope of this thesis and so must be deferred to a later day and place; the (much narrower) task at hand, as I declared in § 4.1, was merely to find *some* role requiring rational belief rather than credence, and this task has been accomplished. Thus, although normative eliminativism as a general thesis about belief and credence has been deemed mistaken, it remains to be seen why rational belief is necessary outside the context of justified blame.[28]

In the following chapter, I bring the arguments of the preceding chapters to a close, and suggest that they recommend the Vague Reduction as an intuitive and tenable view of the relationship between rational belief and credence. I likewise touch upon related fields of inquiry which constitute fertile ground for future discussion, and

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[28] To lay my cards on the table, I am growing less resolutely opposed to the view that normative eliminativism is correct in at least *some* contexts (i.e. that in some contexts, the notion of rational belief can be done away with at no cost), yet is incorrect in others, and further that in these other contexts normative reductionism is correct.

conclude by offering my thoughts concerning the ideal path going forward for those keen on further investigating the relationship between belief and credence.

CHAPTER FIVE

"But Whither Now?"

Before considering where the path beyond this thesis may lead, let's take stock of the arguments constructed in chapters two through four, in hopes of bringing their larger implications into clearer focus. In chapter two, I formally introduced the Straightforward Reduction (i.e. the standard threshold view), which posits sharp cutoffs a and b, such that $0 \leq a < b \leq 1$, and deems belief epistemically rational if and only if $c(p) \geq b$, deems disbelief epistemically rational if and only if $c(p) \leq a$, and deems suspension of epistemically rational if and only if $a < c(p) < b$. After considering, and ultimately finding fault with, Friedman's argument against the Straightforward Reduction, I constructed one of my own which purports to find specious the notion of sharp cut-offs governing the three traditional doxastic attitudes. I thus utilized supervaluationism to offer my own alternative to the Straightforward Reduction, the Vague Reduction, which is less susceptible to such soritical criticisms.

Having done so, in chapter three I addressed two brands of non-reductionist arguments against such threshold views (whether vague or sharp), namely the Lottery and Preface Paradox on the one hand, and the Blue Bus Case on the other. In response to the former, I constructed an argument casting doubt on the conjunction principle which undergirds both paradoxes, and in response to the latter, I questioned the force of the intuitions prompted by such cases by noting that the Principal of Mere Statistical Evidence, which ostensibly lends support to these intuitions, rests on a tenuous foundation. Moreover, given that these objections against normative reductionism purport to establish a normative variant of dualism, it follows that my arguments against them, if successful, leave normative dualism largely unfounded.[1]

Subsequently, in chapter four I proceeded to consider the eliminativist's account of rational belief and credence, according to which the latter is capable of wholly supplanting the former. By presenting and endorsing Buchak's own anti-eliminativist argument, I suggested that eliminativism is not a viable theory, as the notion of rational belief cannot be dispensed with in the norm governing our practice of justly doling out blame. Moreover, I demonstrated that this argument, which would appear to commit us to normative dualism, can in fact be squared with normative threshold views (e.g. the Vague Reduction); doing so does, however, require one to endorse descriptive dualism, which, I submit, is at least palatable.

The upshot of the past three chapters, then, is that the Straightforward Reduction is implausible, non-reductionism is left largely unfounded, and eliminativism seems to be untenable. In turn, the Vague Reduction naturally recommends itself as both a viable and intuitive theory relating rational belief and credence, which is not plagued by the deficiencies of its competitors. To be sure, positive considerations in favor of the Vague Reduction have been conspicuously absent thus far; for my part, I have few to add beyond Scott Sturgeon's observation that threshold views "[yield] an obvious and pleasing story about the causal harmony that exists between coarse and fine belief in everyday practice," coupled with my previous argument that the Vague Reduction is

[1] To say that my arguments leave dualism *completely* unfounded would be inaccurate, as there are of course other cases for dualism beyond those considered in chapter three. Still, the cases considered in chapter three are often viewed as among the most forceful considerations in favor of (normative) belief-credence dualism, and so it is fair to say that my arguments leave dualism at least *largely* unfounded.

superior to standard threshold views, which posit sharp cut-offs.[2] Arguing by way of elimination, however, is fair practice, as the avowed goal of this thesis is to offer a defense of the Vague Reduction, rather than a positive argument which proves it incontrovertible; such arguments, in philosophy, are few and far between. Thus, it suffices for our defense of the Vague Reduction to respond to the charges which have been leveled against it by proponents of competing views, and illustrate that these views suffer from substantial shortcomings which it does not.

At this juncture, Aragorn's question upon reaching Tol Brandir in Tolkien's *Lord of the Rings* is apt: "But whither now?"[3] That is, which topics present themselves as natural avenues for further inquiry? One such topic, briefly touched upon in chapter four, is the *descriptive* relation between outright belief and credence. Along this vein, a score of questions arise: What does it *mean* to believe that *p*? Does it mean nothing more than having sufficiently high credence in *p*? And if not, which rules govern the relation between the two? On this topic, I have already shown my hand—I subscribe to descriptive dualism, in keeping with my commitment to Buchak's argument against eliminativism, and so hold that belief is not simply identical to having sufficiently high credence. Still, other questions remain, not least of which whether there are other grounds motivating descriptive dualism. Moreover, those inclined to agree that belief and sufficiently high credence are not one and the same may yet wonder what exactly distinguishes the two, and likewise which additional factors belief tracks that credence does not.

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[2] Scott Sturgeon, "Reason and the Grain of Belief," *Noûs* 42, no. 1 (2008): 147.

[3] J. R. R. Tolkien, *The Fellowship of the Ring* (Boston, MA: Houghton Mifflin Harcourt, 2014), 384.

Another issue deserving further thought, yet not touched upon in this thesis, is the possible implications that context may have on such threshold views as the Vague Reduction. For instance, it seems plausible that the thresholds governing the epistemically rational doxastic attitudes are not fixed, but rather context-dependent. Perhaps, for instance, the threshold for epistemically rational belief is lower in cases with lower stakes (e.g. whether to believe it will rain tomorrow), and higher in cases with higher stakes (e.g. whether to believe someone committed a crime). Although I have thus far presented the Vague Reduction as if its thresholds were fixed, and so context-independent, the possibility that they are somehow malleable is worthy of further consideration.

One last topic which I choose to make mention of as an avenue for further investigation is the notion of precise versus imprecise credence. While the former naturally arise from objective-chance propositions, e.g. that a given die rolled will land on an even number, the latter are perhaps more prevalent in everyday situations, as our evidence (arguably) does not often support a precise credence, but rather some credence interval. Such threshold views as the Vague Reduction work well with precise credences, yet problems may arise when dealing with credence intervals; what happens, for instance, when we assign a proposition p a credence interval $a < c(p) < b$, where a lies below the threshold for rational belief and b lies above it? Such questions lie beyond the scope of this thesis, but are nonetheless deserving of further consideration, particularly from advocates of threshold views.

At any rate, rather than attempting to offer the final word on the relation between belief and credence, it's clear that this thesis provides a segue into a variety of pertinent questions and topics. Such topics, however, must wait for another day.

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