

ARTICLE

The relationship between belief and credence

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Abstract

Sometimes epistemologists theorize about *belief*, a tripartite attitude on which one can believe, withhold belief, or disbelieve a proposition. In other cases, epistemologists theorize about *credence*, a fine-grained attitude that represents one's subjective probability or confidence level toward a proposition. How do these two attitudes relate to each other? This article explores the relationship between belief and credence in two categories: descriptive and normative. It then explains the broader significance of the belief-credence connection and concludes with general lessons from the debate thus far. Video Abstract link: <https://www.youtube.com/watch?v=3eOSIPVYxI8&feature=youtu.be>

KEYWORDS

belief, belief-first, credence, credence-first, degree of belief, dualism, epistemic rationality, Lockean thesis, lottery paradox, preface paradox, reduction, statistical evidence

1 | INTRODUCTION: BELIEF AND CREDENCE

Belief is a familiar attitude. To believe something is to regard it as true or take it to be the case (Schwitzgebel, 2019). I believe $1 + 1 = 2$ and that it will be sunny tomorrow. According to the tripartite model, there are three doxastic attitudes one can take toward a proposition p : believe p , disbelieve p , and withhold belief, being effectively undecided on whether p .

But consider: I believe both $1 + 1 = 2$ and that it will be sunny tomorrow, but my attitude toward these propositions is not exactly the same—the former is more probable. To capture this, epistemologists appeal to another propositional attitude, called *credence* (also sometimes called *partial belief* or *degree of belief*, but see Moon, 2017). Credences are more fine-grained than beliefs and are often given a value on the $[0,1]$ interval, where 1 represents maximal confidence p is true, and 0 represents maximal confidence p is false. For example, I have a ~ 0.9999 credence $1 + 1 = 2$, but only a ~ 0.9 credence it will be sunny tomorrow. Unlike belief, there are (in principle) an infinite number of credences one can take toward a proposition. While the concept of credence grew out of work on subjective probability (see Ramsey, 1926, p. 166ff, Jeffrey, 1965, de Finetti, 1974, and especially Eriksson & Hájek, 2007),

many contemporary epistemologists posit a close connection between credence and the familiar notion of confidence (Moon, 2019, pp. 276–277; Schupbach, 2018, p. 191).

This article is about the relationship between belief and credence. Section 2 covers the metaphysics of belief and credence, focusing on potential descriptive connections between the attitudes. Section 3 turns to the normative: what is the relationship between rational belief and rational credence? Section 4 concludes with upshots and outstanding issues for further research.

2 | BELIEF AND CREDENCE: DESCRIPTIVE QUESTIONS

2.1 | The ontological question

A natural starting point is *the ontological question*: do we have both beliefs and credences? Eliminativists maintain that belief or credence (or both) do not exist. *Belief-eliminativism* the view that we do not have beliefs. Several philosophers—for example, Jeffrey (1970), Maher (1993, pp. 152–155), Stich (1996), and Pettigrew (2016)—express sympathy for belief-eliminativism. They claim that beliefs are left over from folk psychology—despite appearances, humans do not have beliefs. While belief-eliminativism is simple and explains fine-grained features of our mental lives by appealing to credences, it requires an extensive error theory about commonsense psychology and everyday discourse.

Another eliminativist view is *credal-eliminativism* (Holton, 2008, 2014; Horgan, 2017). Holton (2014, p. 14) writes, “I argue that we cannot form credences at all. The Bayesian approach is not an idealization of something we actually do. Instead, it is quite foreign to us. Just as our core native deliberative state is that of the simple intention, so our core native epistemic state is that of simple, all-out belief.” Holton nonetheless maintains that we have another attitude he calls “partial beliefs” that comes in degrees and stands in contrast to full beliefs. Depending on how broad one’s notion of credence is, then, virtually no one defends credence-eliminativism. After all, we are more confident in some of our beliefs than in others, and it is not obvious how to capture this with a belief-only ontology. Further, if we understand credence as closely connected to degree of confidence, credal-eliminativism also requires revision of folk psychology (Eriksson & Hájek, 2007, p. 209). On a third view, neither belief nor credence exists, but, except for those skeptical of *all* intentional mental states (Churchland, 1981; Rosenberg, 1999, 2018), most will find this implausible.

2.2 | The reduction question

Realists about belief and credence affirm that both attitudes exist, but are divided on a second question: *the reduction question*. Is one attitude more metaphysically fundamental? There are three answers to the reduction question: credence is more fundamental, belief is more fundamental, and neither is more fundamental.

First, consider the *credence-first* view, on which credence is the fundamental attitude, and belief reduces to credence. There are two versions of this view. On the first, belief is maximal credence or credence 1. While they differ in the details, Levi (1991), Roorda (1995), Tang (2009), Wedgwood (2012), Clarke (2013), Greco (2015), and Dodd (2016) all defend versions of this view. One reason to favor this view is that belief and credence 1 have similar functional profiles—they both have content that we tend to treat as true in our reasoning. Also, as Greco (2015, p. 179) emphasizes, the view that belief is credence 1 is clean and simple. On the other hand, it seems like many common beliefs (e.g., it will be sunny tomorrow) are held with less than maximal certainty. It also does not seem like we should take bets at extraordinary odds on all our beliefs, although, according to decision theory, we should take such bets on propositions in which we have credence 1. Further, the belief-as-maximal-credence view cannot capture the plausible datum that we are more confident in some of our beliefs than in others. Defenders of this view reply to these worries by, among other things, denying that credence 1 is certainty and weakening the connection between betting and credence.

On a second credence-first view, belief reduces to credence above some threshold; this is often called *the threshold view*.¹ Simple views posit a fixed threshold, often between 0.5–1; the challenge is to set the threshold at a

place that does not look ad-hoc.² On other views, the threshold for belief is context or stakes-dependent (Bach, 2008; Ganson, 2008; Pace, 2011; Weatherson, 2005). This contextualist view looks less ad hoc, but implies that whether one believes something is context- or stakes-sensitive. Another potential credence-first view says that belief that *p* does not reduce to one's credence in *p*, but to facts about one's credal state as a whole.³

Ross and Schroeder (2014, p. 273ff) raise influential objections to the credence-first view; they argue that belief plays important roles involving correctness, stability, sufficient evidence, and consistency that cannot be played by credences. Staffel (2019a) argues that beliefs play a crucial simplifying role, enabling agents with finite capacities to rule out small error possibilities in reasoning (see also Jackson, 2019b; Tang, 2015; Weisberg, Forthcoming). Buchak (2014) argues that belief, but not high credence, is crucial to our practices of praise and blame, and Friedman (2019) argues that belief and credence play different roles in inquiry (see also Staffel, 2019c).

A second reductionist view is the *belief-first* view.⁴ On this view, belief is the fundamental attitude and credence reduces to belief. On most belief-first views, the fine-grained/numerical features of credence are built into the content of what is believed. On one belief-first view, credences reduce to beliefs with probabilistic content. For example, a 0.9 credence *it is raining* is just a belief *the probability it is raining is 0.9*.⁵ It is worth noting that the content need not be about *probabilities* per se; it could involve something else, like epistemic modals. Other belief-first views, such as Easwaran (2016), reduce credence to the overall pattern of an agent's beliefs (see also Briggs, Cariani, Easwaran, & Fitelson, 2014). Belief-first views have the virtue of simplicity; further, it does seem as though credences and probability-beliefs have a similar functional role.

The main challenges to the belief-first view in the literature focus on the credence-as-probability-belief view. The first involves the interpretation of probability in these beliefs. Christensen (2004, pp. 19–20) pioneered this objection, arguing that frequentist and subjectivist interpretations will not work. Since then, Easwaran (2015, p. 659), Sturgeon (2020, Chapter 9) and Moon and Jackson (Forthcoming) have suggested that the most plausible interpretation is *epistemic probability*. A second challenge, pushed by Frankish (2009), notes that children and animals seem to have credences, but they do not appear to have the concept of probability, and thus cannot have probability-beliefs (see also Eriksson & Hájek, 2007, pp. 206–207; Lee, 2017a). Moon and Jackson (Forthcoming) suggest that the creatures in question either have the relevant probabilistic concept, or do not have credences.

A final view is belief-credence *dualism*. On this view, belief and credence are equally fundamental—we have both attitudes, and neither reduces to the other. Dualism has the cost of being more ontologically complex: it posits beliefs, credences, and probabilistic beliefs—but proponents of the view argue that it has significant explanatory power. There have been both psychological and philosophical arguments advanced for dualism; many involve pointing out inadequacies of the reductionist views.⁶

One objection to dualism is known as *the Bayesian challenge* (Kaplan, 1996). The challenger asks: why would we have both a belief in *p* and a credence in *p*? Historically, proponents of the challenge have questioned the role of belief in particular: if beliefs make the same prescriptions as credences, they are superfluous; if they make different ones, we should trust those made by our credences. Note that a belief-firster could propose what I will call the Belief-first challenge: why think that credences and probability-beliefs are separate, irreducible entities? The attitudes seem to play a similar role. Thus, the challenge for the dualist is to explain the role that beliefs play that high credence cannot (the Bayesian challenge), and the role that credence plays that probability-belief cannot (the Belief-first challenge).⁷ The beginnings of an answer are suggested by the objections to the belief-first and credence-first views above, for example, perhaps beliefs play a crucial role in simplifying reasoning that credences cannot, and perhaps credences play a crucial role in the mental lives of children and animals that probability-beliefs cannot.

2.3 | Additional metaphysical issues

I close this section with two further points. First, what is meant by “reduction”? There are at least three possible interpretations. On the first, reduction is understood as numerical identity: A reduces to B iff A is numerically

identical to B. On this interpretation, the credence-first view, for instance, is the view that beliefs just are credences. While reduction-as-identity is a classic and intuitive view, it does not clearly account for the *asymmetric* nature of reduction. On, say, the credence-first view, there is an asymmetrical relationship between belief and credence—credence is *more fundamental* than belief. Reduction-as-identity has trouble capturing this, as numerical identity is symmetric. On the second interpretation, reduction is supervenience: A reduces to B iff A supervenes on B. A supervenes on B iff there is no difference in A without there being a difference in B (Leuenberger, 2008; McLaughlin & Bennett, 2018). A final option is reduction as grounding: A reduces to B iff A is grounded in B. Grounding is generally taken to entail supervenience but not vice versa, as grounding includes other features such as metaphysical fundamentality and explanatory priority (Fine, 2012; Schaffer, 2009). Generally, proponents of the above views would do well to clarify which notion of reduction they are concerned with, keeping in mind that these three options may not be exhaustive.

Second, note that there is more to the metaphysics of belief and credence than the ontological question and the reduction question. Suppose that belief-credence dualism is true and belief and credence are mutually irreducible. This does not rule out the possibility that belief and credence are perfectly coextensive—one might merely endorse “weak dualism” on which high credence in *p* goes along with a belief in *p*; maybe every probability-belief has a corresponding credence (Sturgeon, 2008, pp. 146–148 and Dallmann, 2017, p. 13 suggest they might “march in step”). Note that weak dualism nonetheless maintains that belief and credence are metaphysically irreducible—they just happen to be correlated with each other in certain ways.⁸ On “strong dualism,” it may be possible to believe *p* and have a low credence in *p*, or believe the probability of *p* is high but have a low credence in *p*. In this, the extent to which beliefs, credences, and probability-beliefs come apart is not fully captured by the reduction question. Jackson (2020) calls the question of how much belief and credence come apart *the independence question*. Thus, the metaphysics of belief and credence then includes (at least) three issues: ontology, reducibility, and independence (Figure 1).

3 | BELIEF AND CREDENCE: NORMATIVE QUESTIONS

3.1 | Normative fundamentality

As with other debates, when considering the belief-credence connection, it is crucial to keep the descriptive and normative distinct. Consider: there are two kinds of thresholds. One, discussed above, is what I have called *the threshold view*, a descriptive claim on which belief reduces to credence above some threshold. A second, related, view posits a *normative* connection between belief and threshold-passing credence. To keep terminology consistent, I will call this normative view *the Lockean thesis*—although some authors use this phrase differently.⁹ The Lockean thesis does not rule out the possibility that agents can believe *p* and have a low credence in *p*, or disbelieve *p* and have a high credence in *p*—it simply means that these agents are irrational. Note that the Lockean thesis, but not the threshold view, is consistent with dualism.

In terms of normative connections between belief and credence, the Lockean thesis has received the most attention, and we will focus there. However, it is worth stepping back to consider general normative connections. Recall the three answers to the reduction question: whether belief, credence, or neither are more fundamental. Views on the normative question can be divided into similar groups. On one view, credence-norms are more fundamental than belief-norms. Maybe rational agents have probabilistically coherent credences and update them appropriately on new evidence (i.e., conditionalization), then simply believe every proposition at or above a threshold (Christensen, 2004). Alternatively, maybe belief-norms are more fundamental than credence-norms (Easwaran, 2016). For example, some argue that beliefs structure our decision matrices, determining what possibilities we should seriously in decision-making, and potentially even determine what propositions we should form

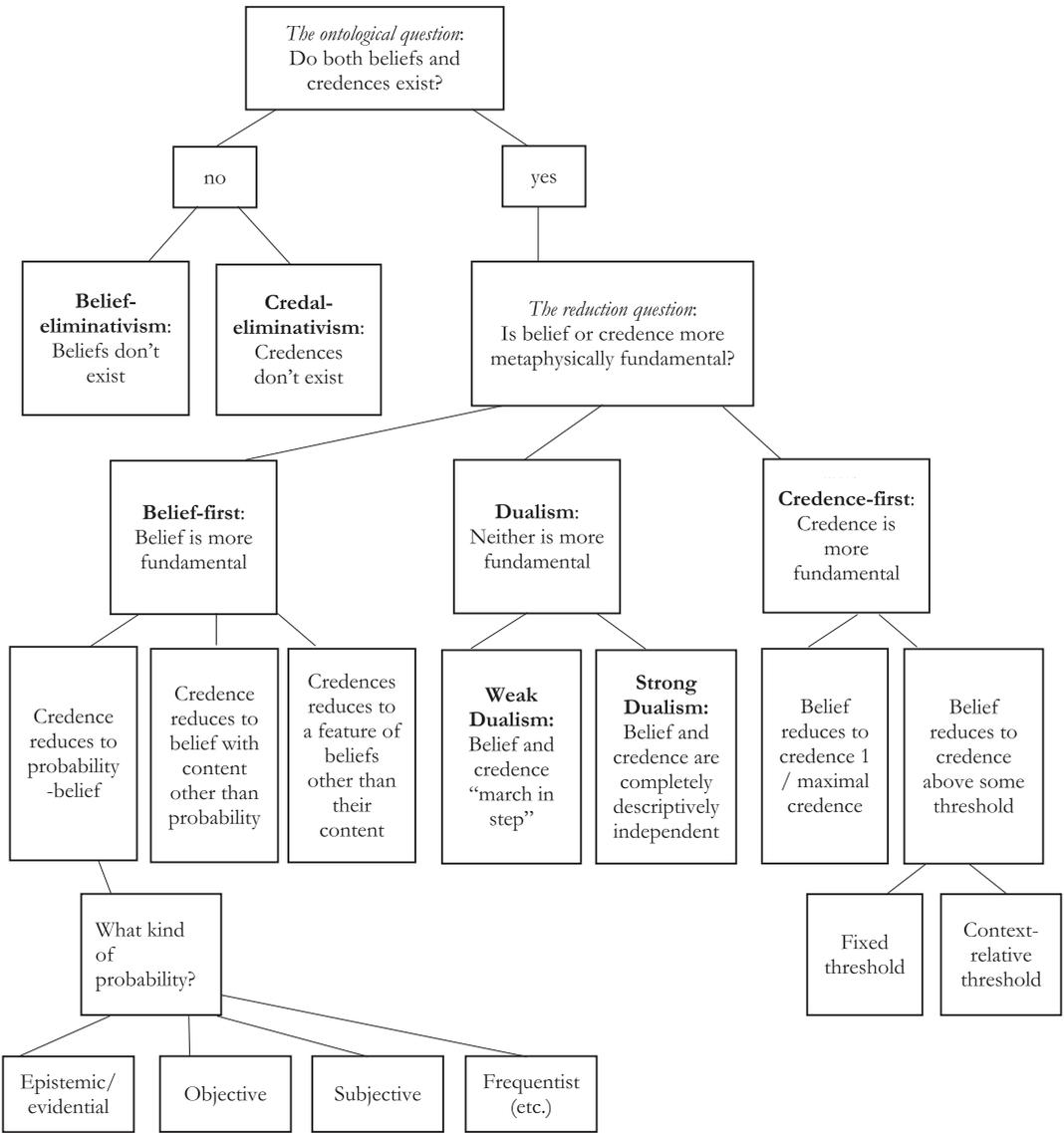


FIGURE 1 The metaphysics of belief and credence

credences in (Foley, 1993, 2009; van Fraassen, 1995; Lewis, 1980; Ross & Schroeder, 2014; Weisberg, 2015, p. 830, Weisberg, Forthcoming; Weatherson, 2016). On a third view, the norms for each attitude are independent: maybe the norms for credence are probabilistic coherence and updating by conditionalization, and the norms for belief are deductive consistency (Frankish, 2009, p. 80; Weisberg, 2015). Relatedly, several authors have argued that rational belief and rational credence are sensitive to different features of a body of evidence, so, for example, one could rationally have a high credence in *p*, but should not believe *p* (see Buchak, 2014; Friedman, 2013; Jackson, 2019c, Forthcoming; Smith, 2010b, 2016; Staffel, 2015). We will return to fundamentality later, but now examine arguably the most widely-discussed normative connection between belief and credence: the Lockean thesis.

3.2 | The Lockean thesis

The Lockean thesis posits a normative connection between belief and high credence.¹⁰ This section distinguishes and evaluates versions of the Lockean thesis. Note that “high credence” can be interpreted in various ways: as credence 1, as credence above a fixed threshold <1 , or as credence above a threshold that varies with context or stakes.¹¹ Below, I will note when different interpretations of “high credence” have significant implications. Further, here, “ought” indicates the ought of epistemic rationality.

Consider first:

Lockean Thesis (traditional): S ought to believe p iff S has a rational high credence in p .

On this version of the Lockean thesis, a rational high credence is necessary and sufficient for rational belief.¹² This does justice to the intuition that rational agents are confident in the propositions that they believe.

Nonetheless, worries loom. The first is *the lottery paradox* (Chandler, 2010; Douven, 2012; Douven & Williamson, 2006; Kyburg, 1961; Leitgeb, 2014b; Smith, 2010a; Weintraub, 2001; Weisberg, 2015, Section 5). Suppose you have a lottery ticket; uncontroversially, you should have a high credence your ticket will lose (a fair 100-ticket lottery puts your credence at 0.99, and we can increase the number of tickets). If the threshold for belief is any value short of one, then, according to the traditional Lockean thesis, there are lotteries in which you ought to believe your ticket will lose. But your ticket is not special: by the same reasoning, you should believe, of each ticket, that it will lose. Further, many think that if you should believe p and you should believe q then you should believe p and q ; this is an example of a *closure principle* (Kvanvig, 2006; Luper, 2016). Given certain closure principles, you should believe a large conjunction: *ticket 1 will lose and ticket 2 will lose and...ticket n will lose*. Nevertheless, you know one ticket will win, and thus you should also believe the negation of this conjunction. But intuitively, you should not believe contradictions. In response, some have suggested that the traditional Lockean thesis is false, and you ought not believe lottery propositions, such as *my ticket will lose*, even though you have a rational high credence in them (Douven, 2002; Jackson, Forthcoming; Kelp, 2017; Ryan, 1996; Smith, Forthcoming; Staffel, 2015).

A second worry for the traditional Lockean thesis involves *naked statistical evidence*. Consider an example from Buchak (2014, p. 292): “You leave the seminar room to get a drink, and you come back to find that your iPhone has been stolen. There were only two people in the room, Jake and Barbara. You have no evidence about who stole the phone, and you don’t know either party very well, but you know (let’s say) that men are 10 times more likely to steal iPhones than women.” According to the statistic, you ought to have a high credence (~ 0.91) that Jake stole the phone. Thus, according to the traditional Lockean thesis, you should believe he stole the phone. However, many, including Buchak, insist that this is the wrong result: you should *not* believe that Jake stole your phone, as you do not have evidence that he in particular stole the phone (see Jackson, Forthcoming; Smith, 2010b; Staffel, 2015, 2019a). This is also supported by legal practices—we likely would not convict Jake of theft merely on the basis of a statistic (Enoch, Spectre, & Fisher, 2012; Gardiner, 2019).

In response to these cases, one might endorse a weaker Lockean thesis: maybe rational high credence is necessary but not sufficient for rational belief. Consider:

Lockean thesis (necessary): S ought to believe p *only if* S has a rational high credence in p .

According to this version of the thesis, rational belief and rational low credence is impossible, but one can have a rational high credence without being required to believe. In lottery and statistical evidence cases, there are propositions we should have a high credence in but should not believe. However, there is a problem for this version of the Lockean thesis: *the preface paradox* (Christensen, 2004; Douven & Uffink, 2003; Easwaran & Fitelson, 2015; Makinson, 1965; Pollock, 1986; Ryan, 1991; Worsnip, 2015). Suppose you write a well-researched book, and you should believe every claim in your book. Again, by closure, you then should believe the conjunction of the claims in your book: *claim 1 and claim 2 and...claim n* . Nevertheless, you might reasonably write in the preface of your book, “while I spent countless hours researching this book, I’m fallible; it is unlikely that all the claims in this book are true.” The large conjunction of all your book’s claims has a low probability. According to the necessity version of the

Lockean thesis, you ought not believe it. Again, we have a contradiction. The preface paradox can be solved by endorsing merely a sufficiency version of the Lockean thesis:

Lockean thesis (sufficient): *S* ought to believe *p* if *S* has a rational high credence in *p*.

This version of the thesis allows for rational belief and low credence, but does not allow for rational high credence without belief. Thus, in preface cases, one can believe the conjunction of all the claims in one's book, even though one assigns it a low credence (Cevolani, 2017; Smith, 2016). Of course, those who endorse this sufficiency Lockean thesis need a response to the lottery and statistical evidence cases. Taken together, the lottery, preface, and statistical evidence cases are counterexamples to both directions of the traditional Lockean thesis.¹³

Lockeans have responded to these paradoxes. Some suggest we ought to give up closure of rational belief: for example, rationally believing *p* and rationally believing *q* may not rationalize believing *p* and *q* (Backes, 2019; Christensen, 2004; Foley, 1993, 2009; Kroedel, 2012; Kyburg, 1963; Sturgeon, 2008; for a defense of closure, see Leitgeb, 2014b). Others argue that we should give up belief-consistency—as long as one's credences are rational and one follows the dictates of the Lockean thesis, a rational agent can have contradictory beliefs (Easwaran, 2016; Easwaran & Fitelson, 2015). Third, some argue that rational belief is context- or question-sensitive (e.g., maybe the threshold for rational belief varies with stakes)—endorsing contextualism is one way to maintain both closure and consistency (Kyburg, 1988; Leitgeb, 2013b, 2014a, 2015, 2017; van Fraassen, 1995; Yalcin, 2018). Naked statistical evidence cases warrant a separate response—Lockeans argue that we can rationally form beliefs based on mere statistical evidence (Ahlstrom-Vij & Dunn, 2014, p. 547; Schmalback, 1986) or that mere statistical evidence is not a basis for rational high credence (Freitag & Zinke, Forthcoming).¹⁴ Another way Lockeans can respond to both the lottery and the statistical evidence cases is by raising the belief-threshold to certainty (Greco, 2015, p. 183).

3.3 | Additional normative issues

In Section 3.1, we discussed three possible views: whether the norms for belief are more fundamental, the norms for credence are more fundamental, or whether both norms are equally fundamental. One might wonder: is the Lockean thesis a normative credence-first view? Not necessarily, although most actual defenders of the Lockean thesis likely treat credence-norms as fundamental. But possibly, there is a normative connection between belief and high credence on which the norms for belief are fundamental. Belief may have its own norms, and once one's beliefs are rational, credence follows suit—one should form a high credence in everything they rationally believe. A dualist about norms could likewise capture the spirit of Lockeanism by saying that belief and credence have separate norms, but for a rational agent, there's never a disconnect between rational belief and rational high credence—they normatively “march in step.” The idea that belief and high credence go together for rational agents, then, is consistent with all three views of normative fundamentality.

A second question involves the relationship between normative and descriptive fundamentality. Here is a point that has been somewhat overlooked: it is most natural for those who endorse a nontrivial normative relationship between belief and credence to be dualists. To see why, consider an example. Suppose you are a credence-firster who maintains that belief reduces to credence above some threshold. Then, it is impossible to believe *p* if your credence in *p* does not meet that threshold. On this view, it is not clear what would motivate endorsing the same threshold as normative. If belief reduces to credence, then the presence of a credence entails the presence of a belief—it is *impossible* to have the latter without the former. The Lockean thesis then does not tell us anything interesting about rational belief—its norms are trivially satisfied. Endorsing a normative connection between high credence and belief is more sensible if it is possible to be irrational. Of course, one could endorse a picture on which there are two thresholds: one for a credence to count as a belief, and a second, higher threshold for rational belief. While this view may sound odd—and I am unaware of anyone who defends it—it may be one of the only ways to endorse both a credence-first view and a nontrivial Lockean view. That said, those interested in defending informative normative connections between belief and credence should be careful, as they may not be able to stay completely neutral on descriptive questions.¹⁵

4 | UPSHOTS AND CONCLUSION

This article outlined various descriptive and normative views of the belief-credence relationship. But why care about this relationship? There are several reasons. One, belief is the fundamental attitude of traditional epistemology, while credence is the fundamental attitude of formal epistemology. Answering metaphysical and normative questions about belief and credence may shed light on the relationship between formal and traditional epistemology. For example, if beliefs (credences) do not exist, then one might question the value of the traditional (formal) epistemology research program. Or, if one attitude is more descriptively or normatively fundamental, that might indicate that the corresponding subfield of epistemology is more fundamental. Equal doxastic fundamentality, however, is evidence that the subfields of epistemology are largely independent research programs (Hájek & Lin, 2017).

A second reason to care about the relationship between belief and credence is because many debates in epistemology (e.g., permissivism, disagreement, pragmatic encroachment) look very different if the primary attitude of debate is belief or credence, and if a reductionist project is successful (Jackson, 2019a, 2020, Palmira, 2017). The relationship between belief and credence has implications for debates in epistemology, philosophy of mind, and beyond.

There is much more to be said about belief and credence. For example, we have assumed they are *propositional* attitudes. If we relax this assumption, however, exciting new possibilities emerge. Sarah Moss recently argues for “a fairly radical conclusion, namely, that probabilistic contents should ultimately replace propositions as the fundamental contents of belief” (Moss, 2018a, p. 14; for a summary, see Moss, 2020). On Moss's view, beliefs and credences are simple mental states with complex contents, and when p is true in every world of the probability space of S 's mental state, S believes p (Moss, 2018a, pp. 55–57). In some sense, Moss's view is one on which belief is certainty (Moss, 2018a, p. 63), but she supplements this view with the thesis that beliefs and credences bear a crucial relationship to loose and strict contents (see Moss, 2018a, Chapter 3 and Moss, 2019). Generally, since Moss does not assume that beliefs and credences are propositional attitudes, it is difficult to fit her view cleanly into the above categories. Nonetheless, Moss's view deserves serious attention from those interested in belief and credence (see Konek, 2016, Moss, 2018b, Greco, 2020, Staffel, Forthcoming, and Pavese, Forthcoming for examples of the wide-ranging implications of Moss' view).

Other topics we have not had space to address include: imprecise credence (Bradley, 2019; Weisberg, 2015, Section 2), comparative confidence (Steffánson, 2017), nonstandard views of the content/attitude distinction (Carr, 2017), normative fundamentality and the principal principle (Lewis, 1980), and many others. Nonetheless, I hope to have clarified some key theses and arguments in this debate, motivated the broad significance and application of the belief/credence connection, and pointed to fruitful areas for further research.

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ENDNOTES

¹ For defenses and discussions of the credence-first view, see Foley (1992, 1993, Chapter 4, 2009), van Fraassen (1995), Hunter (1996), Hájek (1998, p. 204), Christensen (2004, Chapter 2), Weatherson (2005), Ganson (2008), Frankish (2004, 2009, Section 3), Smith (2010a), Pace (2011, pp. 255–256), Leitgeb (2013a), Dallmann (2014, 2017, p. 13),

- Pettigrew (2015a, 2016), Lee (2017a, 2017b), Dorst (2019), Sturgeon (2008, 2010, 2015, 2020). Note that some of these authors, for example, Weatherson and Leitgeb, have since changed their views to less reductive ones; see Weatherson (2016) and Leitgeb (2017).
- ² See Lee (2017b). Shear and Fitelson (2019) suggest a normative fixed threshold for belief—namely, the inverse of the golden ratio (~ 0.618)—that could also be adopted as a descriptive fixed threshold for belief.
- ³ Thanks to Lara Buchak.
- ⁴ For defenses and discussions of the belief-first view, see Harman (1986, 2008), Plantinga (1993, Chapter 1), Lance (1995, Section 4), Schiffer (2003, p. 200), Frankish (2009, Section 2), Weisberg (2013, Section 3.1), Easwaran (2016), Dogramaci (2018, p. 10), Moon (2018, 2019), Kauss (Forthcoming), Moon and Jackson (Forthcoming). Weisberg (2013) suggests that Hawthorne and Stanley (2008) ought to endorse a belief-first view.
- ⁵ Note also that you could have a belief-first version of the threshold view, if you thought that believing p reduced to believing probably p (for instance). In this case, meeting the threshold for belief would simply be a matter of the content believed, rather than a feature of the attitude. Thanks to Julia Staffel.
- ⁶ For defenses and discussions of dualism, see Pollock (1983, 1994), Adler (2002, Chapter 9, Section 1), Hawthorne (2009), Sosa (2011, Chapter 4), Nagel (2011, p. 418), Ross and Schroeder (2014), Buchak (2014), Littlejohn (2015), Pettigrew (2015b), Carter, Jaris, and Rubin (2016), Staffel (2017, 2019a, 2019b), Jackson (2018, 2019b), Friedman (2013, 2019), Weisberg (2013, Forthcoming), Collins (Forthcoming).
- ⁷ For more on the Bayesian challenge, see Stalnaker (1984), Sturgeon (2008), Frankish (2009). For dualist responses to the Bayesian challenge, see Staffel (2017), Jackson (2019b), Weisberg (Forthcoming).
- ⁸ However, if we interpret reduction as supervenience, then this is no longer a dualist view. Thanks to Andrew Moon.
- ⁹ My sense is that “the Lockean thesis” is more often used to refer to a normative, rather than a descriptive, claim—although it is used in both senses. Not much hangs on my choice of terminology. The hill to die on, however, is that we ought to keep normative and descriptive thresholds distinct.
- ¹⁰ Defenses of the Lockean Thesis include Foley (1992, 1993, Chapter 4, 2009), Hawthorne and Bovens (1999), Christensen (2004), Sturgeon (2008), Lin and Kelly (2013), Locke (2014), Easwaran (2016), Shear and Fitelson (2019), Dorst (2019), Thorn (Forthcoming). Arguments against the Lockean Thesis include Friedman (2013), Buchak (2014), Staffel (2015), Smith (2010a, 2016), Kelp (2017), Jackson (2019c, Forthcoming).
- ¹¹ For contextualist views of the Lockean threshold, see Weatherson (2005), Ganson (2008), Pace (2011), Fantl and McGrath (2010, p. 160). (Some of these authors also discuss contextualist versions of the descriptive threshold view). Ross and Schroeder (2014) offer objections to the contextualist Lockean threshold. Leitgeb’s stability theory is also a contextualist view, on which rational belief is stably high credence; see Leitgeb (2014a, 2015, 2017), and see Staffel (2015) for an objection to Leitgeb’s view. A further issue concerns whether, even if context-dependent, the threshold must always be above 0.5. Authors who suggest the threshold is plausibly above 0.5 include Foley (1993, p. 144), Hunter (1996, p. 87), Chandler (2010, p. 669), Pettigrew (2015a, p. 13), Worsnip (2015, p. 552), Lee (2017a, pp. 273–4). However, Hawthorne, Rothschild, and Spectre (2016) argue that the threshold may sometimes be below 0.5.
- ¹² S ’s high credence in p must be rational because S could be irrationally overconfident in p , and that does not give S grounds to believe p . However, one could pose a *coherence* version of the Lockean thesis on which that belief and high credence must go together (but normally the Lockean thesis is not understood as merely a coherence constraint). Thanks to Justin D’Ambrosio for helpful discussion.
- ¹³ Note also that the lottery, preface, and statistical evidence cases may also count against the descriptive threshold view, if they describe cases where it is psychologically possible to believe a proposition but have a low credence in it, or withhold belief on a proposition but have a high credence in it—see Jackson (2020) for discussion.
- ¹⁴ For other responses to naked statistical evidence cases, see Hedden and Colyvan (2019), Ross (Forthcoming), Papineau (Forthcoming).
- ¹⁵ Several authors—for example, Leitgeb (2017) and Shear and Fitelson (2019)—endorse normative connections between belief and credence but purport to stay neutral on descriptive connections.

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