Synthese (2020) 197:5073–5092
https://doi.org/10.1007/s11229-018-01965-1

Belief, credence, and evidence

Elizabeth Jackson[1]

Received: 29 March 2018 / Accepted: 25 September 2018 / Published online: 4 October 2018

Abstract
I explore how rational belief and rational credence relate to evidence. I begin by looking at three cases where rational belief and credence seem to respond differently to evidence: cases of naked statistical evidence, lotteries, and hedged assertions. I consider an explanation for these cases, namely, that one ought not form beliefs on the basis of statistical evidence alone, and raise worries for this view. Then, I suggest another view that explains how belief and credence relate to evidence. My view focuses on the possibilities that the evidence makes salient. I argue that this makes better sense of the difference between rational credence and rational belief than other accounts.

Keywords Belief · Credence · Evidence · Rationality · Lottery paradox · Statistical evidence · Salience

1 Introduction

A topic of recent interest in epistemology is the relationship between belief and credence.[1] Here, my interest is in questions about how belief and credence relate to different types of evidence. While most of our evidence is both belief-generating and credence-generating, it has been suggested that certain types of evidence ought to affect one's credences more than one's beliefs.[2] In this paper, I explore this suggestion further and look more closely at the relationship between belief, credence, and evidence.

[1] See Jackson (forthcoming$_a$) for why the relationship between belief and credence is an important epistemological question.

[2] Buchak (2014), Staffel (2015), Smith (2010).

✉ Elizabeth Jackson
ejackso9@nd.edu

[1] Dept of Philosophy, University of Notre Dame, 100 Malloy Hall, Notre Dame, IN 46556, USA

I focus on three cases: cases of naked statistical evidence,[3] lottery cases,[4] and hedged assertions, with an eye toward seeking a unified explanation of these cases. These cases are unique in that they seem to be credence-generating but not belief-generating; they seem to be cases where rational agents ought to raise their credence in some proposition but not believe it. Why would this be? Why does some evidence affect our credences rather than our beliefs? These are the questions I will explore. My primary aim is not to argue that these cases are ones that are credence-justifying but not belief-justifying. Rather, it is to convince the reader who is already sympathetic to my verdicts about the cases that I can explain them better than other accounts.

I proceed as follows. In Sect. 2, I cover relevant background material. In Sect. 3, I describe the three cases I seek to elucidate. In Sect. 4, I consider a potential explanation for these cases that has been suggested in the literature, that one ought not form beliefs on the basis of mere statistical evidence, and argue it is insufficient. In Sect. 5, I provide my own account of what is going on in these cases. My account centrally involves the possibilities a piece of evidence makes salient. I argue for my account in Sect. 6, showing how it explains the cases in Sect. 3, and does better than the statistical evidence account discussed in Sect. 4. I conclude in Sect. 7.

2 Background

A few caveats before I begin. First, the focus of this paper is normative, not descriptive. I am interested in rational belief and rational credence—so I am not primarily concerned with providing a psychological description of these mental states, but rather with how these states ought to function.

Second, it is crucial to clarify the notion of rationality I am concerned with in this paper. Several philosophers have noted there are many strands of rationality; some have suggested there are as many as nine different kinds.[5] In this paper, by "rational," I 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. I am concerned with this notion of rationality for three reasons. One, I think this is roughly what many epistemologists mean by "rational" when they use the term in an unspecified way. Two, it is more action-guiding and applicable to actual human agents than more idealized versions of rationality. Three, the agents I focus on have both beliefs and credences, but I will leave open whether very idealized agents (e.g. agents with greater mental processing power than regular humans) have both beliefs and credences, or have only credences. So, holding our mental processing power fixed, I am interested in questions about how we ought to respond to the evidence we encounter.

A final point involves how I am understanding the difference between belief and credence. Belief is a familiar attitude that is not degreed[6]; roughly, it is a propositional

[3] Buchak (2014). See also Cohen (1977), Thomson (1986), Colyvan et al. (2001).

[4] Kyburg (1961), Nelkin (2000), Hawthrone (2003), Collins (2006), Staffel (2015), Kelp (2017), Horgan (2017).

[5] See Cohen (2010: p. 663) and Plantinga (1993a: pp. vii–viii, 1993b: pp. 132–161).

[6] A note on terminology: people often use the phrase "degrees of belief" to refer to a mental state that comes in degrees and in some sense, represents the world. I think such a mental state exists, but for our purposes,

attitude we have when we take something to be the case or regard it as true.[7] A popular thought is that there are three belief-like attitudes S can take toward a proposition p that S has considered: S can believe that p, S can believe that not-p, and S can withhold belief, believing neither p nor not-p. One view of belief is that S believes that p iff S rules out worlds in which not-p holds.[8] A similar view is that when S believes p, S treats p as true for some particular purpose, e.g. for making a decision.[9] For this paper, I need not commit to one of these theories of belief, but they provide a general idea of what belief amounts to and how it contrasts with credence.

Credence, like belief, is a propositional attitude, but unlike belief, is a degreed attitude. S's credence that p represents something like the subjective probability of p for S, often given a value on the [0,1] interval. Unlike belief, there are an infinite number of possible credences one can take toward a proposition (at least in principle); credences are fine-grained, whereas beliefs are coarse-grained. One important difference between credence and belief is that when one believes something, one has, in a sense, settled the matter; belief that p is a commitment to the truth of p. However, credence (with the exception of credence 0 and 1) keeps possibilities open; a high credence in p is not necessarily a commitment to the world's being such that p is true.[10]

Credence has been traditionally associated with betting behavior.[11] For example, on some views of credence, S's credence in p is the amount of money S is willing to pay in ordinary circumstances for a bet that yields $1 if p and $0 if not-p.[12] There are problems with both reducing credences to betting behavior and with the assumption that credences are perfectly measured by betting behavior.[13] However, it is plausible that betting behavior can generally be used as a heuristic to approximate one's credences. So, for the purposes of this paper, I make the modest assumption that there is a *rough correlation* between one's betting behavior and one's credences.

Footnote 6 continued
I call that "credence," which I contrast with belief, a categorical state. One might prefer to use phrases like "partial belief" or "degrees of belief" instead of credence, and then call what I call belief "categorical belief." I am not necessarily opposed to this, but given that some have argued that beliefs do not come in degrees (see Moon (2017)), my terminology is more ecumenical.

7 Schwitzgebel (2015).

8 Buchak (2014: p. 286). See also Holton (2014), Greco (2015).

9 Weatherson (2005), Wedgwood (2012), Ross and Schroeder (2014), and Locke (2014) all have views on which some kind of treating-as-true condition is necessary for belief.

10 See Nagel (2010: p. 418), Ross and Schroder (2014: pp. 275–277). One worry for this claim is that this is inconsistent with the threshold view of belief, on which belief that p is a high credence in p above some threshold (less than 1). However, those who hold to the threshold view could embrace this claim by maintaining that a credence's meeting the threshold gives the attitude additional properties, which makes it function like a belief and causes the agent to close off possibilities (see Weisberg forthcoming: p. 22). Nonetheless, those sympathetic to the threshold view of belief will almost certainly disagree with my verdicts about the cases in section III, as in those cases, one's credence in p can get arbitrarily close to one, yet one ought not believe p. In this, my assumptions about belief and credence may be inconsistent with a threshold view of belief.

11 See Ramsey (1926), Jeffrey (1965), de Finetti (1990).

12 Jeffrey (1965: p. 60).

13 For objections to the view that credences are reducible to and/or measurable by betting behavior, see Foley (1993: ch. 4), Plantinga (1993b: ch. 6), Christensen (2004: 5.2), Hajek and Eriksson (2007), and Steffánson (2017).

When it comes to the relationship between belief and credence, a view that may seem natural is a view on which belief is credence 1 [Greco (2015: p. 179) calls this "the simple view"]. Philosophers generally take credences to be measureable with real numbers between 1 and 0, where 1 represents maximal credence, and some have suggested that believing p is identified with having credence 1 in p.[14] However, the idea that belief is credence 1 is in tension with the plausible idea that we hold many of our beliefs with less than maximal certainty, and that we are more confident in some of our beliefs than in others. Further, according to orthodox decision theory, we ought to bet anything on the propositions we have credence 1 in, but we need not bet anything on our beliefs. Thus, for the purposes of this paper, I will set belief-as-credence-1 views aside.

3 The cases

Usually, when we receive significant evidence for or against some proposition, the evidence ought to affect both our beliefs and our credences. I perceive a coffee cup on the table, so I both believe and have a high credence it is on the table. I hear from a reliable friend that the talk is at 3:00 today, so I believe and have a high credence the talk is at 3:00. However, not all cases are like these. Sometimes, one's evidence generates a rational high credence but not rational belief. I focus on three of these cases. These cases are especially illuminating because they are cases where belief-generating evidence and credence-generating evidence come apart. Focusing on them can provide insight as to when (and why) some evidence ought to affect just one's credences, and when it ought to affect one's beliefs as well. To be clear, my main objective in this section is not to *argue* that these cases are credence-justifying but not belief-justifying; I instead merely intend to explain the cases and show the reader that this conclusion is defensible.

3.1 Naked statistical evidence

The first instance of rational high credence without rational belief is cases where one has merely statistical evidence (or "naked statistical evidence") for some proposition. Lara Buchak (2014: p. 292) gives several examples of this, including the following:

> 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.

She says that, in this case, you do not have enough evidence to rationally believe that Jake stole your phone—it doesn't seem like you have evidence that he in particular stole the phone. However, based on your statistical evidence, you should have a high

[14] For more on the view that belief is credence 1, see Levi (1991), Roorda (1995), Wedgwood (2012), Clarke (2013), Greco (2015), Dodd (2016).

credence (~0.91) that Jake stole the phone; Buchak thinks that, if you were forced to bet on who took it, you should bet on Jake.

Not only does she think this is the intuitive reading of the cases, but this is also justified by legal norms. We would never convict someone of a crime based on statistical evidence alone.[15] In a related example from the legal literature, Buchak explains that a jury would never convict a bus company for hitting someone merely based on the fact that they operate 90% of buses in that town. It is interesting to note, however, they would generally convict the company based on the testimony of a 90% reliable eyewitness.[16] The idea that it is irrational to form a belief based on statistical evidence alone makes sense of this behavior; if our evidence doesn't allow us to rationally believe a company is guilty, we ought not convict them, even if it gives us high confidence they are guilty.[17] Thus, "naked statistical evidence" is credence-justifying but not belief-justifying.[18]

3.2 Lottery propositions

The second case is relatively familiar: the lottery paradox. Suppose I have a lottery ticket that is part of a fair lottery of 100 tickets. I ought to have a high credence my ticket will lose (0.99). However, many have the intuition that I ought not believe my ticket will lose; after all, one ticket is going to win, and my ticket might just be the winner. We need not rely merely on this intuition; there are also arguments that one ought not believe their ticket will lose.

If I can rationally believe my ticket will lose, and rational belief is closed under conjunction, then I rationally believe the large conjunction that <ticket 1 will lose and ticket 2 will lose and ticket 3 will lose…>. However, I also believe the negation of this conjunction, since one ticket will win. Assuming it is irrational to have contradictory beliefs, we ought to reject one of the above assumptions, and a natural assumption to reject is that I can rationally believe my ticket is a loser.[19] I will borrow Hawthorne's terminology and call propositions like <my ticket is a loser> "lottery propositions."[20]

[15] See Enoch et al. (2012), Bloom-Tillmann (2015, 2017), and Di Bello (Forthcoming).

[16] Buchak (2014). For earlier discussions of similar cases, see Thomson (1986) and Schauer (2003); this case originated with a real civil case from the 1940 s. Thanks to an anonymous referee.

[17] See Thomson (1986), Kaplan (1996), Smith (2010, 2016, forthcoming), Nelkin (2000), Enoch et al. (2012), Staffel (2015), Pasnau (2018).

[18] One might worry that the reason it seems impermissible to form such beliefs is not because of the nature of one's evidence, but because of the moral stakes involved. See Bolinger (forthcoming). Thanks to Wes Siscoe. However, consider a case where I know either a man or a woman is wearing a hat, and I know that men are 10 × more likely to wear hats than women. It still seems like I shouldn't believe the man is wearing the hat merely on the basis of the statistic alone, even though nothing is at stake morally. Further, there aren't high moral stakes in many versions of the lottery and hedged assertions, but those cases also don't justify belief.

[19] See Staffel (2015). Horgan (2017) also maintains one ought not believe lottery propositions: "outright belief that one's lottery ticket will lose does not seem epistemically justified, no matter how high are the odds against winning." For other discussions of the lottery paradox, especially with respect to the relationship between belief and credence, see Kyburg (1961), Foley (1993: ch. 4), Christensen (2004: ch. 2), Sturgeon (2008), Nelkin (2000), Collins (2006), Kelp (2017).

[20] Hawthorne (2003: ch. 1).

A second argument that one ought not believe lottery propositions is as follows. I cannot know my lottery ticket lost. Knowledge is the norm of belief. Therefore, I ought not believe my lottery ticket lost.[21] Thus, it is plausible that one ought to have a high credence in but not believe lottery propositions; one's evidence that one lost the lottery is credence-justifying but not belief-justifying.[22]

A related case is from Martin Smith (2010), adapted from Dana Nelkin (2000). This case is similar to the lottery case, but I include it to show that lottery-style cases can be quite broad.

> Suppose that I have set up my computer such that, whenever I turn it on, the colour of the background is determined by a random number generator. For one value out of one million possible values the background will be red. For the remaining 999 999 values, the background will be blue. One day I turn on my computer and then go into the next room to attend to something else. In the meantime, Bruce, who knows nothing about how my computer's background colour is determined, wanders into the computer room and sees that the computer is displaying a blue background.[23]

Smith's verdict is that, while Bruce can justifiably believe that his computer's background is blue, Smith himself ought not to believe this. However, Smith ought to have a very high credence (0.999999) that Smith's background is blue.[24] Thus, as in the lottery case, Smith's evidence in the computer screen case is credence-justifying but not belief-justifying.

3.3 Hedged assertions

A final case that is credence-justifying but not belief-justifying is the case of hedged assertions. Suppose you are trying to figure out if it will rain tomorrow, and you ask a friend about it. They report, "I think it is supposed to rain tomorrow, but I'm honestly not sure." Or, they might say, "It will probably rain tomorrow, but there's a chance I'm wrong." In this case, it seems as though you ought to raise your credence it will rain tomorrow, but since these assertions are hedged, you should not form a belief that it will rain tomorrow. As Adler notes, "Expressions for full belief are unqualified assertions, but expressions for [credence] are explicitly introduced by epistemic qualifiers like 'I am pretty sure that…' or 'On the evidence, it is probable that…'"[25] Thus, many cases of hedged assertions are credence-justifying but not belief-justifying.

Note that hedged assertions have a different epistemic character than the statistical evidence cases and the lottery cases—in the former two cases, your evidence makes p extremely probable, but you still ought not believe p. In the case of hedged assertions,

[21] Staffel (2015). See Williamson (2000: p. 255).

[22] See Kelp (2017) for an additional argument that it is irrational to believe lottery propositions.

[23] Smith (2010: pp. 13–14).

[24] Smith does not explicitly note this because his focus is not on credence, but I take this to be uncontroversial. He does note that "the probability of P given E can reach any level (short, perhaps, of one) without one having justification for believing P" (17).

[25] Adler (2002: p. 42).

however, the evidence may not significantly raise the probability of p; many cases of hedged assertions wouldn't warrant exceptionally high credences. (Of course, you might receive testimony of the form "I'm 99% sure it is raining," but it seems natural to classify this as statistical evidence for p).[26]

Nonetheless, I mention these cases of hedged assertions because they still fall under the general description of the first two scenarios: cases that are credence-justifying but not belief-justifying. All else equal, we should prefer an account of evidence that can classify all the cases together—when evidence justifies a raised credence but not belief, and when evidence justifies a very high credence but not belief. I will show how my account provides a unified explanation for all these cases; the more surprising ones (where one ought to have a very high credence but ought not believe) and the less surprising ones (where one's credence ought to slightly increase but one ought not believe).

3.4 Proposed explanations

We have seen three cases of high credence without belief: cases of naked statistical evidence, lottery cases, and hedged assertions. Several accounts have been proposed to explain these cases, including accounts that appeal to safety or sensitivity,[27] a view on which we ought not form beliefs on the basis of mere statistical evidence, and a view that appeals to a notion called "normic support." In what follows, I propose an alternative account. I will set aside the safety/sensitivity views, and I discuss the statistical evidence view extensively in the next section. However, the normic support view warrants some discussion, as it compliments the account I eventually endorse in noteworthy ways.

Martin Smith is one of the primary defenders of the normic support account.[28] Recall the case above where Smith is merely aware of the random number generator that determines the computer's background color, but Bruce perceives the blue background. Smith uses the term "normic support" to describe the kind of evidential support Bruce has for the proposition that the background is blue. Smith's support for this proposition, however, is non-normic. One way to demarcate the difference between normic and non-normic support involves when evidentially supported but false beliefs cry out for explanation. When we have normic support for a belief and the belief turns out to be false, we seek some kind of explanation for why it is false. More precisely:

A piece of evidence E normically supports a proposition P just in case the situation in which E is true and P is false is abnormal, in the sense of requiring special explanation.

Bruce's belief has normic support, and this is why, if Bruce's belief that the screen was blue is false, we'd want to know why—was he hallucinating, or suddenly struck with color blindness? However, if Smith's belief were false, we would not seek such an explanation. Thus, when we have evidence that non-normically supports some

[26] Thanks to an anonymous referee.

[27] For discussion, see Enoch et al. (2012), Enoch and Fisher (2015), Bloom-Tillman (2015).

[28] Smith (2010, 2016, forthcoming).

proposition, no such explanation is sought.[29] Smith suggests that for one's belief that p to be justified, one's evidence must normically support p.[30]

Smith's account, while plausible and thought-provoking, still leaves some questions unanswered. Specifically, what kinds of evidence provide normic support, and what kinds do not? What evidence generates the need for an explanation, in the event that the proposition in question turns out to be false?[31] In what follows, I hope to shed light on some of these questions. I do not intend to criticize Smith's account, but rather to expand it and offer further explanation for its verdicts.[32] Before doing so, I both clarify and criticize an alternative view—the statistical evidence view.

4 Rational belief and statistical evidence

I begin this section by clarifying a popular theory about rational belief and evidence—what I will call the "statistical evidence view." I suggest a plausible version of the statistical evidence view and show how it makes sense of our three cases above. Finally, I raise a few worries for it. Ultimately, I will not fully reject the idea behind the statistical evidence view, namely, that in many cases, we ought not form beliefs on the basis of statistical evidence alone. Something like it will complement the account I eventually endorse. However, I think this account gets a small number of cases wrong, and that my account offers a more complete and accurate explanation of the data.

A number of authors, including Julia Staffel and Lara Buchak, have suggested that, in general, statistical evidence should not produce belief.[33] For example, Staffel claims that "it is irrational to hold outright beliefs based on purely statistical evidence."[34] A plausible precisification of this principle is as follows:

(1*) It is irrational to believe that p or withdraw belief that p on the basis of mere statistical evidence that bears on p.

A few notes about (1*). First, because it is widely accepted that statistical evidence can produce probabilistic belief, it is crucial to keep the content of the evidence and the content of the belief the same.[35] Second, I've used the phrase "withdraw belief from p" to indicate going from believing p to withholding belief that p.[36] In the same way statistical evidence alone doesn't justify belief, it also seems like if one's body of evidence justifies belief that p, and then one gets statistical evidence *against* p (i.e. for not-p), one ought not withhold belief that p on that basis.[37] For example, suppose someone reliably testifies that the Blue Bus company hit the pedestrian, and then you learn that 5% of the buses operating that day were from the Blue Bus company. You

[29] Smith (2010: pp. 15–19).

[30] Ibid, 17.

[31] Thanks to an anonymous referee.

[32] However, for a recent criticism of Smith, see Backes (forthcoming).

[33] See Buchak (2014), Thomson (1986), Kaplan (1996), Nelkin (2000).

[34] Staffel (2015: p. 1725).

[35] Thanks to John Keller.

[36] Thanks to an anonymous referee.

[37] For a discussion of related cases, see Smith (2016: pp. 109–120).

shouldn't withhold belief that the Blue Bus company did it on this basis, although you should plausibly lower your credence.[38]

(1*) explains the first two cases. Consider the case where a bus company would not be convicted simply because they operated 90% of the buses in a particular city, but they would be convicted on the basis of a 90% reliable eyewitness. If (1*) is true, then we can see why: in the first scenario, you have merely statistical evidence that the company is responsible. However, in the second scenario, you have fairly reliable testimony that they did it, and this justifies belief.

(1*) also explains the lottery case. Several philosophers have defended the idea that the reason it is irrational to believe lottery propositions is because statistical evidence should not produce belief.[39] If, in a lottery scenario, you only have statistical evidence you will lose, this account can explain why is it irrational to believe your ticket will lose. Further, if your computer's background is determined by a random number generator, even if 999,999/1,000,000 times it is blue, you still have mere statistical evidence it is blue. However, the direct perception of the blue background isn't statistical evidence; you can rationally believe on this basis.

However, I have four main worries about endorsing (1*) as a complete or final explanation for the cases. First, it is unclear that the statistical evidence view gives the correct verdict on the hedged assertion case; it's hard to see why a hedged assertion (especially one that doesn't appeal to any specific probabilities) should be a piece of naked statistical evidence. While, as mentioned above, the hedged assertion case seems different than the lottery case and Buchak's case (because it doesn't raise one's credence as significantly), we still have reason to prefer an account that can give a unified explanation of all three cases.[40]

The second worry for (1*) involves all-or-nothing statistics. Consider the case where I know that either Jake or Barbara took my phone. Suppose, instead of knowing that men are 10 times more likely to steal cell phones than women, I know that 100% of people who steal cell phones are men.[41] This is a piece of statistical evidence, but it also seems like I can rationally believe that a man stole my phone on this basis alone.

Two caveats for this second worry. First, probability 1 may not suffice for belief in general, such as in lotteries with infinitely many tickets. Plausibly, in an infinite lottery, the probability your ticket will lose is 1, but you ought not believe it will lose.[42] One option here is to appeal to infinitesimals, and maintain that the probability you will lose

[38] However, it is plausible that the fact that you shouldn't withhold belief here is because the statistical evidence is trumped by the testimonial evidence, so this case may not draw any sort of interesting contrast between belief and credence. Thanks to an anonymous referee.

[39] Thomson (1986), Kaplan (1996), Nelkin (2000).

[40] Thanks to an anonymous referee.

[41] For a similar criticism of the statistical evidence view, see Enoch and Fisher (2015: Part I). One might worry that 'statistics' in the limit are not merely statistical evidence, because they posit a necessary connection between two things. However, it is unclear why evidence's drawing a necessary connection between two things precludes that evidence's being statistical. For example, suppose someone claims that having blue hair causes cancer. You ask for some statistical evidence to support their claim, and they say "100% of people with blue hair have cancer." This seems like an apt response. It would be odd to complain that this isn't mere statistical evidence because the correlation is too tight; it is unclear that a perfect correlation precludes that connection's being statistical. I am grateful to an anonymous referee for raising this objection.

[42] Thanks to Daniel Rubio and an anonymous referee.

isn't 1, but is infinitely close to 1. However, whether you find infinitesimals plausible or not, it is reasonable to think that probability 1 suffices for belief in finite cases, and this is enough to generate a problem for the statistical evidence view. Second, the clearest case where the 100% statistic justifies belief is when it ranges over past, present, and future cases—then the statistical evidence entails that a man is guilty. A less clear statistic (but potentially a more realistic one) would only apply to past cases; however, knowing only men have stolen cells phones in the past may not justify believing a man is guilty.[43]

A third case that is tricky for (1*) is a case where you get testimony for p from an eyewitness that is, say, 85% reliable. The more you focus on their assertion that 'p,' the more it seems like you can rationally believe on the basis of their testimony. However, the more you focus on the fact that they are merely 85% reliable, the more their testimony begins to seem like statistical evidence, and the intuition that you can rationally believe on the basis of their testimony is less clear. This kind of case generalizes; in fact, it seems like any case where the evidence is uncertain can be described in a way that makes it seem like statistical evidence.[44] What is interesting about these cases is that the way in which the evidence is presented, can, at least sometimes, affect whether the agents in question ought to form a belief or merely a credence. Why would the presentation of the evidence matter?

A final way (1*) could be improved involves the completeness of its explanation. Even if it tells us something interesting about what evidence doesn't justify belief, but what evidence *does* justify belief? Buchak notes that one upshot of her cases is that, when it comes to rational belief and rational credence, type of evidence matters. She says that "rational credence and rational belief are sensitive to different features of evidence…[a body of evidence] separately determines rational credence and rational belief."[45] Presumably, credences are sensitive to all parts of a body of evidence. Any kind of evidence gain or loss ought to move around one's credences. (1*), then, tells us what kind of evidence rational belief is insensitive to, but doesn't tell us what kinds of evidence rational belief is *sensitive* to. What part of a body of evidence justifies belief?

A natural answer on behalf of the statistical evidence view is that non-statistical evidence justifies belief.[46] However, there are at least two problems with this suggestion. First, we need a story about what counts as non-statistical evidence. Given the difficulties of defining what counts as statistical evidence,[47] this could be a challenging task. Second, there are cases of non-statistical evidence that do not justify belief, including both testimonial and perceptual evidence. Consider again the hedged assertion: it may raise one's credence, but may not justify belief that p; e.g. "I think it will rain this afternoon, but I'm not sure." There are also perceptual cases with the same structure. One might see a blurry object from far away that slightly resembles a familiar object, e.g., you briefly see a faraway deer running quickly through the woods. In both cases,

[43] Thanks to an anonymous referee.

[44] See Buchak (2014: p. 301).

[45] Ibid, 295.

[46] Thanks to an anonymous referee.

[47] See Buchak (2014: p. 301) on the problem of defining statistical evidence.

you have non-statistical evidence for some proposition that is credence-justifying and not belief-justifying. Thus, there seem to be some problems for the suggestion that non-statistical evidence justifies belief. In the next section, I offer an alternative view.

5 B-evidence and C-evidence

In this section, I distinguish between two kinds of evidence and suggest that this demarcation can capture the way in which beliefs respond to evidence differently than credences. I explain the distinction and clarify how it shows what part of a body of evidence is merely credence-generating, and what part is also belief-generating. Then, I motivate my view by arguing that it makes sense of all three cases in section III, but does better than the statistical evidence account with respect to the worries I raised in section IV.

5.1 Two kinds of evidence

The distinction I have in mind divides one's evidence for a particular proposition into two categories, depending on the possibilities that the evidence makes salient. More specifically:

B-evidence Evidence for p that does *not* make salient the possibility of not-p.
C-evidence Evidence for p that makes salient the possibility of not-p.[48]

Some examples might help illustrate this distinction. We often get B-evidence when we get evidence that p is true without qualification, such as when someone asserts p.[49] We get C-evidence for p when we get statistical evidence for p, but also when we get evidence for p that is hedged or qualified in some way: "P is decently likely, but I'm honestly not sure." Given this distinction, we can modify (1*) as follows:

(1) It is irrational to believe that p or withdraw belief that p on the basis of mere C-evidence that bears on p.

The basic idea behind (1) is that, in general, rational agents hold beliefs on the basis of evidence that does not make salient the possibility they are wrong. However, C-evidence will affect a rational agent's credences. Accordingly, insofar as there is a connection between credence and betting behavior, C-evidence will have behavioral import.[50]

(1) also does not mean that *believing* p is incompatible with not-p being salient (or that withholding belief is incompatible with the possibility of p being salient). Rational

[48] Thanks to Blake Roeber. See Ross and Schroder (2014: p. 276).

[49] However, there are exceptions to this. Someone uttering "That is a zebra, not a cleverly painted mule" may make salient the possibility it is not a zebra, and thus count as C-evidence, and thus not justify belief. Thanks to an anonymous referee.

[50] For this reason, agents who fail to alter their beliefs on the basis of C-evidence will not be susceptible to the base rate fallacy. They will alter their credences in accord with the base rates, and bet accordingly. For more on the base rate fallacy see Kahneman (2011: ch. 14); for a response to Kahneman, see Feldman (1988: pp. 85–86).

agents hold beliefs all the time in face of the possibility that they are wrong.[51] For example, you might be a juror on a court case and rationally decide the evidence best supports the proposition that Jones is the murderer. This belief is compatible with the possibility that you are wrong being salient, e.g. many fellow jurors may be asserting that Jones is not the murderer and giving evidence for this. However, your belief that Jones is the murderer, if rational, will at least partially be based on *evidence* that does not make salient the possibility that he is the murderer. That is, sufficient B-evidence must be at least part of the basis for your belief in Jones's guilt. This is why, for example, it would be irrational to believe that Jones did it simply because of a statistical generalization about his gender or race.

This distinction also suggests the following:

(2) It is rational to believe that p on the basis of sufficient B-evidence for p, and rational to withdraw belief that p on the basis of sufficient B-evidence for not-p.

(2) includes the modifier 'sufficient' because whether one ought to form a belief on the basis of B-evidence depends on many factors, such as how good the B-evidence is and what the rest of the agent's body of evidence looks like. Still, (2) gives us an idea of what kind of evidence generally justifies forming or giving up a belief.

5.2 Salience

The difference between B-evidence and C-evidence has to do with what possibilities each makes salient. But what is salience? David Lewis suggests that salience is closely connected to the possibilities to which one is attending.[52] Taking a cue from Lewis's suggestion, I distinguish two ways a proposition X might be salient:

Descriptive salience X is descriptively salient for S iff S pays attention to X.
Normative salience X is normatively salient for S iff S ought to pay attention to X.[53]

Here, "pay attention" involves what S is focused on. This involves propositions, possibilities, and representations that are occurrent for S. For example, it might involve the beliefs S forms about possibilities. At first blush, a general definition of salience would have both a descriptive and a normative component, as it seems like it would involve both what one is actually paying attention to, but also might involve, say, possibilities that are obvious but one is irrationally ignoring.[54]

In showing how my view explains the cases above, it is especially important to clarify what it means for *a possibility* to be salient for an agent. If one follows Lewis closely, one might think that descriptive salience best captures what makes a possibility salient:

Possibility p is salient for S iff S pays attention to p.

[51] Thanks to Lara Buchak. See Locke (2014), Tang (2015), Moon (2018).

[52] Lewis (1996: p. 559). See especially Lewis's "Rule of Attention." See also Stalnaker (2002), Fantl and McGrath (2010: pp. 55–58).

[53] Thanks to Alan Hajek.

[54] Thanks to Ben Lennertz and Andrew Moon.

Though, recall that in this paper, we are concerned with agents who properly respond to their evidence. If S is responding to her evidence appropriately, S will pay attention to the possibilities she ought. Hence, when the above definition is applied to the agents I have in mind in this paper, the following holds:

S pays attention to p iff given S's evidence, S ought to pay attention to p.

In other words, for the rational agents of concern in this paper, Descriptive Salience and Normative Salience collapse. Here is an example to illustrate this point. Suppose, in normal circumstances, a reliable testifier informs you that your significant other is at the grocery store. If you are responding to your evidence correctly, you should form a belief that your partner is at the store. However, suppose instead, you are irrational and overly paranoid that your partner is cheating on you. Then, in response to the testimony, you might doubt they are at the store, consider the possibility that they are elsewhere, worry you are being lied to, etc.[55] Since this latter agent isn't responding to their evidence as they ought, whether they ought to form beliefs or credences in response to their evidence is beyond the scope of this paper; my focus is on the former sort of agent. Thus, for all S, where S is a rational agent:

Possibility p is salient for S iff S rationally pays attention to p,

where S pays attention to all the possibilities that S ought to be considering. It is also worth noting that agents who are rational in my sense will not, in every circumstance, consider the possibility they might be wrong.[56] They respond to their evidence properly, but they have limited cognitive faculties, as we do. Thus, they cannot always consider the possibility of error. They will do so when their evidence calls for it, but they will also ignore or close off possibilities.[57]

6 Motivating my account

At this point, I hope that the reader has a grasp on the basic distinction between B-evidence and C-evidence, and how this distinction applies to the relationship between rational belief and evidence (claims 1 and 2). In this Section, I argue that my account makes sense of all three cases in Sect. 3, and does better than the statistical evidence account with respect to the worries I raised in Sect. 4.

[55] This raises an interesting question: given your irrational paranoia, should you believe your partner is at the store? A larger project that involved both rational and irrational agents would say something about this question. More generally, it would discuss agents who respond to their evidence in less-than-ideal ways, either because they fail to consider possibilities they ought to pay attention to (someone being careless or thoughtless), or because they consider possibilities they ought not consider (an overly neurotic, anxious person). It might be the case that the neurotic person ought not to form as many beliefs as the person who is responding normally to evidence, because the anxious person's evidence would make the possibility they are wrong more salient. However, what doxastic attitudes irrational agents ought to form in response to their evidence is ultimately beyond the scope of this paper.

[56] Thanks to Fritz Warfield.

[57] Note also that if pragmatic encroachment occurs, then a change in stakes might cause a change is what possibilities ought to be salient for an agent, and thus affect what that agent should believe. However, I remain neutral on whether stakes affect what is salient for rational agents.

6.1 Explaining the cases

First, my account gives us the right result in Buchak's cases. When one learns that men are 10 times more likely to steal cell phones than women, one ought to think it is likely a man was the thief, but the statistic makes clear that a woman's being guilty is a live possibility. Thus, in the non-limit cases, statistical evidence will count as C-evidence. In the bus case, the fact that 90% of the buses in a town are run by Company X is merely C-evidence that Company X hit the pedestrian, and thus, we ought not believe Company X did it or convict them on this basis. However, when a reliable eyewitness testifies that they saw one of Company X's buses hit the pedestrian, we have B-evidence that Company X is responsible, and ought to both believe they did it and (in normal circumstances) convict them on this basis.

Second, recall the lottery paradox. My account can explain why one ought not believe their ticket will lose: in a normal lottery set-up, agents have evidence that directs their attention to the possibility that they might win. One knows that one ticket is going to win, and winners are celebrated and given lots of attention. When a lottery ticket is in hand, one's evidence calls one to pay attention to the possibility they might just be the winner. Because one's evidence makes salient the possibility that they won't lose, one's evidence is C-evidence. Since rational belief is not based on C-evidence alone, one ought not believe one will lose.[58] Since credence is sensitive to C-evidence, one nonetheless ought to have a high credence they will lose.[59]

Finally, my view explains the hedged assertion case. Qualified or hedged assertions that p, such as "I think that p, but I'm honestly not sure," or "Probably p, but there's a chance I'm wrong" make salient the possibility of not-p, and thus count as mere C-evidence for p. Thus, they are credence-justifying but not belief-justifying. Further, a hazy or far away perception of p also calls the agent to pay attention to the possibility of error, so the agent should raise her credence in p but ought not believe p.[60] In both cases, the agents receive mere C-evidence, which isn't a basis for rational belief.

6.2 Normic support and C-evidence

My account compliments and illuminates Smith's account. My account can explain why we ought to have a high credence in but not believe propositions for which we have mere non-normic support. C-evidence for p will almost always provide non-normic support for p; given only C-evidence, one ought not think that p is true under normal

[58] Collins (2006) also argues that the salience of the possibility of error does important work in the lottery paradox, but his application is to knowledge, rather than rational belief. He suggests the following necessary condition on knowledge to explain lottery cases, which nicely complements my account: "If there is some possibility that is very close to actuality that p is false, and to which S assigns a non-zero probability, then no matter how subjectively improbable this possibility is, S doesn't know that p." For a related discussion about the relationship between lotteries, statistical evidence, and knowledge, see Nelkin (2000).

[59] Staffel (2015: pp. 5–7). See also Hawthorne (2003: ch. 1).

[60] For instance: suppose we are trying to figure out what time it is, and there is a far-away, blurry clock (with hands), that makes it look roughly like it is 5:30 but it could also be 4:30 or 6:30. This would be some evidence that it is 5:30, but the nature of the perception should cause us to pay attention to the fact that we might be wrong; it would be natural to classify a blurry perception of this clock as C-evidence. For more on how perception might probabilistic, see Wedgwood (forthcoming).

conditions. Why? Recall that cases of non-normic support are marked by the fact that we don't look for an explanation if our belief turns out to be false. Since C-evidence calls us to pay attention to the possibility of error, it makes sense that we wouldn't seek an explanation for the false belief—error was already a real, live possibility. In other words, there is a correlation between the following:

- S has evidence for p that makes salient the possibility of not-p.
- S does not look for an explanation if S learns not-p.

To see this, consider Smith's example again. Smith, who knows his computer background is determined by a random number generator, takes the possibility the background is red to be live, even though it is overwhelmingly likely that his background is blue. Since his evidence makes the possibility of error salient, he doesn't look for an explanation if turns out to be red, and he ought not believe the background is blue.

On the other hand, B-evidence for p is correlated with normic support for p. When Bruce perceives the blue background, his perceptual evidence does not call to mind the possibility that the background isn't blue; he is not considering the possibility of error. If he finds out he was wrong about the computer background, this will be surprising; this is a possibility he had not considered. Thus, he will wonder why this surprising fact obtained, and look for an explanation for it. So there is also a correlation between the following:

- S has evidence for p that does not make salient the possibility of not-p.
- S looks for an explanation if S learns not-p.

Thus, my account complements and illuminates Smith's. In this, one can accept both my view and Smith's view: since they give the same verdicts on the relevant cases, I see no reason to think that we must pick between them. Rather, they elucidate each other and shed light on the relevant phenomena. For instance: why do we tend to look for an explanation when a false belief is normically supported? Because the possibility of not-p was not one we were considering. Why do we tend not to look for an explanation when a false belief is not normically supported? Because not-p was already a real, live possibility. Thus, salience can help us understand normic support, and normic support can help us understand salience.

6.3 Statistical evidence and C-evidence

Not only can my account explain the three cases from section III, but it also does better than the statistical evidence account in section IV. Recall the first worry for the statistical evidence account: it seems like I can rationally form a belief that p on the basis of an all-or-nothing statistic that supports p. My account can explain this. In the case where one knows that 100% of people who steal cell phones are men, one's evidence, although statistical, will be B-evidence, and this explains why one can rationally believe a man did it on the basis. In the limit case, statistical evidence is B-evidence.

Second, unlike the statistical evidence account, my view tells us what kind of evidence is usually belief-justifying: B-evidence. This explains all of our cases: why

hearing the winning numbers justifies your belief you lost the lottery,[61] why the eyewitness testimony justifies you believing Jake is guilty, and why perceiving the blue computer screen justifies your belief that it is blue. In all of these cases, you can rationally form a belief that p because your evidence does not make salient the possibility of not-p. Of course, not all B-evidence will justify altering one's beliefs; this depends on a variety of factors, such as what evidence you already possess, how confident you are in that particular belief, etc. In many of these cases, however, when one rationally changes one's beliefs, this will generally be due to a gain or loss in B-evidence. When one ought not to, say, give up a belief on the basis of some B-evidence, it will often be because they have even stronger B-evidence in favor of that proposition. The close relationship between rational belief and B-evidence becomes apparent when all the B-evidence is taken into account.

Recall the case discussed above in which an 85% reliable eyewitness testifies that p.[62] It is difficult to say whether one ought to form a belief on this basis; it is not pre-theoretically obvious what one ought to believe. However, we noted above that intuitions about this case do seem to vary with the way the case is described or the way the evidence is presented.

My view can explain this ambivalence, and specifically it can explain why the way the evidence is presented matters. Whether one ought to form a belief will depend on what the evidence makes salient. If the witness simply asserts p (even if you know upon reflection that the witness is not perfectly reliable), then their testimony, qua B-evidence, can justify belief. At the same time, it is plausible that if the lawyer emphasizes the fact that a certain eyewitness is *only 85% reliable*, then it is much less clear that you ought to form a full-out belief on the basis of the eyewitness's testimony. Rather, you ought to pay more attention to the possibility that the witness is unreliable; thus, the possibility that not-p is salient. Thus, in this evidential situation, their testimony is a piece of C-evidence rather than a piece of B-evidence. Nonetheless, you ought to still give the witness some evidential weight, and adjust your credences accordingly. In short, cases in which you know the testifier is less than fully reliable can count as either B-evidence or C-evidence, depending on the specifics of the case and to what agents with the evidence ought to be paying attention.

One might worry that this is a counterintuitive consequence rather than an interesting feature of my account. It seems odd that presenting the same piece of evidence in two different ways can affect whether agents *ought* to form beliefs in response to evidence. Of course, as a matter of psychological fact, our dispositions to form beliefs might differ based on the way the evidence is presented. Rational agents, however, would not be sensitive to epistemically irrelevant features about the way evidence is presented, e.g., the difference between someone's testimony and a lawyer's emphasizing the fact that the testifier is not fully reliable.[63]

In response, I acknowledge this is *prima facie* counterintuitive, but the seeming counterintuitiveness is due to a conflation of two different kinds of rationality. Recall that the notion of rationality I am considering applies to agents like us. As agents

[61] See DeRose (1995: p. 24), Schaffer (2004).

[62] Buchak (2014: p. 292).

[63] Thanks to Fritz Warfield.

with limited cognitive faculties, we cannot always consider the possibility that we are wrong, but will do so when our evidence brings this possibility to mind. Whether this possibility ought to come to mind for finite agents can, in some cases, be a matter of the way the evidence is presented. This will, in turn, affect whether a cognitively limited agent ought to believe on that basis. Idealized agents, on the other hand, will not be affected by the presentation of evidence in this way because they can consider the possibility of error in every situation. Thus, I commit to the following two claims:

- How evidence is presented makes no difference to the appropriate doxastic response of ideal agents.
- How evidence is presented *can* make a difference to the appropriate doxastic response of non-ideal, rational agents.

When these two senses of rationality are disambiguated, the counterintuitiveness goes away. One might wonder, given this distinction: what is the difference between credence-justifying evidence and belief-justifying evidence for *ideally rational agents*? If ideally rational agents have beliefs, we would need a different story about rational belief formation for these agents. However, some have suggested that the primary reason we have beliefs is to simplify reasoning by ruling out small error possibilities[64]; on this picture, it is natural to think that ideally rational reasoners would not have beliefs.[65] I will not take a stand on this debate, but it has important consequences for a further project that extends the theory of evidence to include the ideally rational.

Finally, my account can explain why many have been tempted to endorse the statistical evidence view, that we ought not form/alter beliefs on the basis of statistical evidence. Naked statistical evidence for p, excluding cases of 0% and 100%, will almost always make the possibility of not-p salient; for this reason, my view can vindicate the insight that, in many cases, it seems irrational to form beliefs on the basis of statistics alone. Thus, I do not want to fully reject the statistical evidence account; it gives us insight into the nature of rational belief. My account should be preferred, however, because it gets even more cases right and gives a more complete explanation of the nature of rational belief and credence.

7 Conclusion

In this paper, I have argued that, while it is irrational to base a belief on mere C-evidence, rational belief is based on B-evidence. I examined three cases in which rational belief and rational credence come apart: lottery cases, cases of naked statistical evidence, and hedged assertions, with an eye toward finding a unified explanation for these cases. I argued that the statistical evidence view, while illuminating, is problematic and in need of supplementation. I suggested my own view: that it is irrational to alter one's beliefs on the basis of C-evidence, but rational to alter them on the basis

[64] See especially Staffel (2017, Forthcoming$_a$), and also Lin (2013), Lin and Kelly (2012), Wedgwood (2012), Smithies (2012: p. 278), Tang (2015), Weatherson (2016), Staffel (Forthcoming$_b$).

[65] See Ross and Schroeder (2014), especially the last section, "Historical Postscript."

of sufficient B-evidence.[66] I argued this explains all three of the cases in question but does better than the statistical evidence view. Thus, I suggest that the distinction between B-evidence and C-evidence does important work with respect to the question of how rational belief and rational credence respond to evidence.[67]

References

Adler, J. (2002). *Belief's own ethics*. Cambridge: MIT Press.

Backes, M. (Forthcoming). Normalcy, justification, and the easy-defeat problem. *Philosophical Studies*. Available at: https://link.springer.com/article/10.1007/s11098-018-1155-y. Accessed 28 Sept 2018.

Bloom-Tillman, M. (2015). Sensitivity, causality, and statistical evidence in courts of law. *Thought, 4,* 2.

Bloom-Tillman, M. (2017). 'More likely than not'—knowledge first and the role of statistical evidence in courts of law. In A. Carter, E. Gordon, & B. Jarvis (Eds.), *Knowledge first*. Oxford: Oxford University Press.

Bolinger, R. J. (Forthcoming). The rational impermissibility of accepting (some) racial generalizations. *Synthese*. Available at: https://doi.org/10.1007/s11229-018-1809-5. Accessed 28 Sept 2018.

Buchak, L. (2014). Belief, credence, and norms. *Philosophical Studies, 169*(2), 285–311.

Christensen, D. (2004). *Putting logic in its place*. Oxford: Oxford University Press.

Clarke, R. (2013). Belief is credence one (in context). *Philosopher's Imprint, 13,* 1–18.

Cohen, J. (1977). *The probable and the provable*. Oxford: Oxford University Press.

Cohen, J. (2010). Rationality. In J. Dancy, E. Sosa, & M. Steup (Eds.), *A companion to epistemology*. Hoboken: Wiley-Blackwell.

Collins, J. (2006). Lotteries and the close shave principle. In S. Hetherington (Ed.), *Aspects of knowing*. New York: Elsevier Science.

Colyvan, M., Regan, H. M., & Ferson, S. (2001). Is it a crime to belong to a reference class*?*. *Journal of Political Philosophy, 9*(2), 168–181.

de Finetti, B. (1990). *Theory of probability* (Vol. I) (first edition 1974). New York: Wiley.

DeRose, K. (1995). Solving the skeptical problem. *The Philosophical Review, 104,* 1.

Di Bello, M. (Forthcoming). Trial by statistics: Is a high probability of guilt enough to convict? *Mind*. Available at: https://doi.org/10.1093/mind/fzy026.

Dodd, D. (2016). Belief and certainty. *Synthese, 194*(11), 4597–4621.

Enoch, D., & Fisher, T. (2015). Sense and sensitivity: Epistemic and instrumental approaches to statistical evidence. *Stanford Law Review, 67,* 557–611.

Enoch, D., Spectre, L., & Fisher, T. (2012). Statistical evidence, sensitivity, and the value of knowledge. *Philosophy & Public Affairs, 40,* 3.

Fantl, J., & McGrath, M. (2010). *Knowledge in an uncertain world*. Oxford: Oxford University Press.

Feldman, R. (1988). Having evidence. In D. F. Austin (Ed.), *Philosophical analysis*. Dordrecht: Kluwer Academic Publishers.

Foley, R. (1993). *Working without a net*. Oxford: Oxford University Press.

Greco, D. (2015). How I learned to stop worrying and love probability 1. *Philosophical Perspectives, 29,* 179–201.

Hajek, A., & Eriksson, L. (2007). What are degrees of belief? *Studia Logica, 86,* 2.

Hawthrone, J. (2003). *Knowledge and lotteries*. Oxford: Oxford University Press.

Holton, R. (2014). Intention as a model for belief. In M. Vargas & G. Yaffe (Eds.), *Rational and social agency: Essays on the philosophy of Michael Bratman*. Oxford: Oxford University Press.

[66] I apply this view to questions about the rationality of faith in Jackson (forthcoming$_b$).

[67] Thanks to Andrew Moon, Blake Roeber, Fritz Warfield, John Keller, Martin Smith, Renee Bolinger, Greta Turnbull, Wes Siscoe, Calum Miller, Lara Buchak, Alan Hajek, Jeff Tolly, Ben Lennertz, Ting Lau, Anne Jeffery, Nevin Climenhaga, Dustin Crummett, Ross Jensen, Rebecca Chan, Julia Staffel, Robert Audi, Lizzie Fricker, Daniel Nolan, the Doxastic Voluntarism seminar and the epistemology reading group at Notre Dame, and audiences at the 2016 St. Thomas Summer Seminar, 2016 Society for Christian Philosophers Eastern Regional Meeting, the 2016 Indiana Philosophical Association, the 2017 Philosopher's Cocoon Conference, and three anonymous referees from this journal for helpful comments that improved this paper in many ways.

Horgan, T. (2017). Troubles for bayesian formal epistemology. *Res Philosophica, 94*(2), 233–255.
Jackson, E. (Forthcoming$_a$). Belief and credence: Why the attitude-type matters. *Philosophical Studies*. Available at: https://doi.org/10.1007/s11098-018-1136-1. Accessed 28 Sept 2018.
Jackson, E. (Forthcoming$_b$). Belief, credence, and faith. *Religious Studies*. Available at: http://dx.doi.org/10.1017/S0034412518000446. Accessed 28 Sept 2018.
Jeffrey, R. (1965). *The logic of decision*. (Second edition 1983). Chicago: University of Chicago Press.
Kahneman, D. (2011). *Thinking fast and slow*. New York: Farrar, Straus, and Giroux.
Kaplan, M. (1996). *Decision theory as philosophy*. Cambridge: Cambridge University Press.
Kelp, C. (2017). Lotteries and justification. *Synthese, 194,* 1233–1244.
Kyburg, H. E. (1961). *Probability and the logic of rational belief*. Middletown: Wesleyan University Press.
Levi, I. (1991). *The fixation of belief and its undoing: Changing beliefs through inquiry*. Cambridge: Cambridge University Press.
Lewis, D. (1996). Elusive knowledge. *Australasian Journal of Philosophy, 74,* 4.
Lin, H. (2013). Foundations of everyday practical reasoning. *Journal of Philosophical Logic, 42,* 831–862.
Lin, H., & Kelly, K. (2012). Propositional reasoning that tracks probabilistic reasoning. *Journal of Philosophical Logic, 41,* 957–981.
Locke, D. (2014). The decision theoretic Lockean thesis. *Inquiry, 57,* 1.
Moon, A. (2017). Beliefs do not come in degrees. *Canadian Journal of Philosophy, 47*(6), 1–19.
Moon, A. (2018). The nature of doubt and a new puzzle about belief, doubt, and confidence. *Synthese, 195*(4), 1827–1848.
Nagel, J. (2010). Epistemic anxiety and adaptive invariantism. *Philosophical Perspectives, 24*(1), 407–435.
Nelkin, D. (2000). The lottery paradox, knowledge, and rationality. *The Philosophical Review, 109,* 3.
Pasnau, R. (2018). Belief in a fallen world. *Res Philosophica, 95*(3), 531–559.
Plantinga, A. (1993a). *Warrant and proper function*. Oxford: Oxford University Press.
Plantinga, A. (1993b). *Warrant: The current debate*. Oxford: Oxford University Press.
Ramsey, F. (1926). Truth and probability. Reprinted in *The foundations of mathematics and other logical essays*, ed. R. B. Braithwaite. (1950). London: The Humanities Press.
Roorda, J. (1995). Revenge of Wolfman: A probabilistic explication of full belief. Available at: https://www.princeton.edu/~bayesway/pu/Wolfman.pdf. Accessed 28 Sept 2018.
Ross, J., & Schroeder, M. (2014). Belief, credence, and pragmatic encroachment. *Philosophy and Phenomenological Research, 88*(2), 259–288.
Schaffer, J. (2004). From contextualism to contrastivism. *Philosophical Studies, 119,* 73–103.
Schauer, F. (2003). *Profiles, probabilities, and stereotypes*. Cambridge: Belknap Press.
Schwitzgebel, E. (2015). Belief. *Stanford Encyclopedia of Philosophy*. Available at: http://plato.stanford.edu/entries/belief/. Accessed 28 Sept 2018.
Smith, M. (2010). What else justification could be. *Nous, 44,* 1.
Smith, M. (2016). *Between probability and certainty: What justifies belief*. Oxford: Oxford University Press.
Smith, M. (Forthcoming). When does evidence suffice for conviction?. *Mind*. Available at: https://academic.oup.com/mind/advance-article/doi/10.1093/mind/fzx026/4555414. Accessed 28 Sept 2018.
Smithies, D. (2012). The normative role of knowledge. *Nous, 46,* 265–288.
Staffel, J. (2015). Beliefs, buses, and lotteries: Why rational belief can't be stably high credence. *Philosophical Studies, 173*(7), 1721–1734.
Staffel, J. (2017). Accuracy for believers. In *Episteme*, book symposium on Pettigrew's *accuracy and the laws of credence* (Vol. 14(1), pp. 39–48).
Staffel, J. (Forthcoming$_a$). How do beliefs simplify reasoning? *Nous*. Available at: https://doi.org/10.1111/nous.12254. Accessed 28 Sept 2018.
Staffel, J. (Forthcoming$_b$). Attitudes in active reasoning. In M. B. Jackson & B. B. Jackson (Eds.), *Reasoning: New essays on theoretical and practical thinking*. Oxford: Oxford University Press.
Stalnaker, R. (2002). Common ground. *Linguistics and Philosophy, 25,* 701–721.
Steffánson, H. O. (2017). What is 'Real' in probabilism? *Australasian Journal of Philosophy, 95*(3), 573–587.
Sturgeon, S. (2008). Reason and the grain of belief. *Nous, 42,* 139–165.
Tang, W. H. (2015). Belief and cognitive limitations. *Philosophical Studies, 172,* 249–260.
Thomson, J. (1986). Liability and individualized evidence. *Law and Contemporary Problems, 49*(3), 199–219.

Weatherson, B. (2005). Can we do without pragmatic encroachment? *In Philosophical Perspectives, 19*(1), 417–443

Weatherson, B. (2016). Games, beliefs and credences. *Philosophy and Phenomenological Research, 92,* 209–236.

Wedgwood, R. (Forthcoming). A probabilistic epistemology of perceptual belief. *Philosophical Issues*. Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/phis.12130. Accessed 28 Sept 2018.

Wedgwood, R. (2012). Outright belief. *Dialectica, 66,* 3.

Weisberg, J. (Forthcoming). Belief in psyontology. *Philosopher's Imprint*. Available at: http://jonathanweisberg.org/pdf/Psyontology.pdf. Accessed 28 Sept 2018.

Williamson, T. (2000). *Knowledge and its limits*. Oxford: Oxford University Press.