

Are Credences Different from Beliefs?

An exchange in three essays between Roger Clarke and Julia Staffel

draft of July 29, 2022

Forthcoming in *Contemporary Debates in Epistemology, Vol. 3*, edited by B. Roeber, M. Steup, J. Turri and E. Sosa.

Credences are degrees of belief

Roger Clarke

Belief is to credence as circles are to ellipses. The concepts *credence* and *ellipse* generalize their counterparts. Beliefs and circles have some special properties that credences and ellipses lack, but they have other properties in common. One member of each pair is a special case of the other.

On the picture I'll sketch here, *credence* is a technical concept introduced explicitly as a generalization of the more ordinary concept of *belief*. Credence often covaries with confidence (of which we have an ordinary concept), but the two should not be conflated; nevertheless, they often are, sometimes for understandable reasons. So, in §2, I will offer an error theory of how we've come to speak interchangeably of credence and confidence.

Before all that, let's start by pinning down the ordinary notion of *belief* at issue. Later, I'll return to this characterization to explain how, exactly, *credence* generalizes it. Here are some claims about belief, none entirely uncontroversial, but each quite standard:

- (1) Belief parallels assertion. This may mean, variously, that belief is a species of assertion (e.g., in inner speech), that those who believe *p* will assert *p* under certain circumstances, or that those who assert *p* do so sincerely if they believe *p*. At the very least, what a person says is typically a reliable guide to what they believe.
- (2) Belief is action-guiding. Belief is the complement to desire in belief-desire explanations of intentional action. If one believes *p*, then one acts as if *p*.
- (3) Beliefs provide premises for reasoning. If deductive logic provides rational constraints on any of our attitudes, it constrains rational belief.

Generalizing from belief to credence will involve modifying or even abandoning some of these claims. Modification: we might replace (1) with:

- (1') Speakers with lower credence in *p* will tend to hedge their assertions of *p* to a greater extent than speakers with higher credence. For example, in order of increasing credence:
 - “I'm not sure, but maybe the cat is on the mat.”
 - “The cat is probably on the mat.”
 - “The cat is on the mat.”

- “The cat is definitely on the mat.”

On the other hand, we might just abandon (3) when we move from belief to credence: perhaps rational credence is governed not by deductive logic but by the probability calculus, and perhaps credences cannot serve as premises in reasoning.¹ I’ll have more to say about rational norms on belief and credence in §3.1.

Most important, though, is (2). Credences can explain the actions of uncertain agents who lack belief. Instead of belief-desire psychology, we fit credences into calculations of expected utility. Someone who is not certain whether p is true or false may act as if p in some circumstances but as if not- p in others; if the pattern of choices satisfies certain constraints, we can explain those choices in terms of maximizing expected utility.

When I say that *credence* is a generalization of *belief*, I mean to say that credences are, literally, *degrees of belief*. For that reason, I’ll begin by addressing an objection to the possibility of belief coming in degrees due to Andrew Moon. My response to this objection will provide a useful analogy for understanding the relationship between *credence* and *belief*: the latter is an ordinary, commonsense notion; the former is a technical concept explicitly introduced as a generalization thereof.

1. Strong belief, strong marriage

1.1 Moon: Stronger belief is not more belief

Moon (2017) argues that belief does not come in degrees. Some of Moon’s arguments aim only to show that the ordinary notion of *belief* is not degreed; some go further, aiming to establish the stronger claim that there cannot be degrees of belief, that any degreed notion we might introduce would not be a notion of belief. Later, in §3.2, I’ll object to an argument of the stronger sort, but here I’ll discuss—and endorse—an argument for the weaker conclusion.

Moon (2017, §4) acknowledges that ordinary language sometimes speaks of one belief being stronger or firmer than another. But Moon points out that this does not mean there are degrees of belief: rather, it suggests there is a property of beliefs, strength or firmness or confidence, which comes in degrees. Moon offers an analogy to make the point (pp. 768–9):

My seeing a panda does not seem to be the sort of thing that comes in degrees. I just see the panda, and there cannot be much or little of the seeing. Pointing out that I could see the panda clearly or very clearly should not diminish this intuition. Similarly, Jay’s belief that *unicorns are real* does not seem to be the sort of thing that comes in degrees. He just believes this proposition, and there cannot be much or little of that belief. Pointing out that he can hold this belief firmly or very firmly or with confidence or with much confidence should not diminish this intuition.

¹But see Staffel (2019).

I think Moon is right here: the fact that strength comes in degrees and beliefs can be strong or weak does not show that belief comes in degrees. Let me offer another analogy which, I think, makes Moon’s point more vividly than the analogy with seeing a panda: marriage. Some marriages are stronger than others, but this does not show that marriage comes in degrees. On the contrary, marriage is, in every jurisdiction I know of, explicitly an all-or-nothing affair. But we can imagine a possible history where this changed—where we developed an institution of marriage that came in degrees.

1.2 Freedomian marriage reform

Consider Freedomia, a modern democratic nation a lot like the others you’ve heard of. Lawmakers in Freedomia, like their counterparts in those other countries, have recently introduced legislative reforms redefining marriage. Unusually, though, Freedomian reforms have not only changed which people are allowed to marry each other, but also broadened the types of relationship recognized under the law. In particular, the Freedomian law now recognizes relationships involving varying degrees of commitment, conferring rights and responsibilities in corresponding degrees.

Traditionally, Freedomian marriages began with a ceremonial exchange of explicit vows under the supervision of an appropriate authority figure, along with an exchange of tokens (usually rings). But Freedomian law also recognized so-called “common law” marriages: as in many other jurisdictions, “the act of the couple representing themselves to others as being married and organizing their relation as if they were married, means they are married.”² Campaigners for marriage reform in Freedomia therefore sought to re-examine what it should mean to organize a relation “as if married”.

The reformers argued that both the requirements for and the consequences of marriage should be treated in finer detail. First, traditional marriage bundled together a variety of separable conditions. For example, married partners traditionally live together, are romantically and sexually monogamous, share income and assets for purposes of calculating tax and state benefits, must divide those shared assets on divorce, are protected from testifying against each other in criminal trials, make decisions on each other’s behalf when one partner is incapacitated, inherit each other’s property in the absence of a will (taking priority over blood relatives), and so on.

Second, some of these conditions, like cohabitation or monogamy, come in degrees. Partners might sleep under the same roof every night, or only certain days of the week, or only certain months of the year. Likewise, monogamy can be more or less strict according to which sorts of activities or relationships are reserved for the partners alone, or how many exceptions are tolerated.

For these reasons, Freedomian law was revised to treat matrimony as a relation that comes in degrees, among other reforms. (To avoid both neologism and confusion with the traditional, non-degreed *marriage*, the reformers prefer to use the synonym *matrimony*—but we suspect that nobody will be so careful after a few decades, once the new institution takes root.) Some of the legal

²https://en.wikipedia.org/wiki/Common-law_marriage

consequences of matrimony are likewise degreed: Freedomian partners share income in proportion to their degree of matrimony. (Freedomian taxes are complicated.) Other consequences only take effect for partnerships meeting a certain matrimonial threshold: spouses married more than X cannot be compelled to testify against each other; spouses married more than Y are considered closer relations than any blood relative for inheritance purposes, those married less than Y but more than Z are considered closer than first cousins but more distant than siblings, and so on.

Traditional non-degreed marriage is still recognized under Freedomian law: partners can still make an explicit and full commitment to each other, taking on the full bundle of rights and requirements; this is also recognized as a degree of matrimony, namely the maximum degree. Common-law marriage, however, is a contested issue. When partners do not explicitly commit themselves to the highest degree of matrimony (or any other specific degree), the matter of determining which degree of matrimony they present themselves as having, or organize their relation around, is complicated. Some Freedomians take the view that any relation which would have amounted to common-law marriage before the reforms should still be taken as such; others say that such an extreme commitment should only be posited in extreme circumstances. It remains an open question how, exactly, “full marriage” (as it is sometimes called) relates to degrees of matrimony. But there is no dispute that matrimony is a generalization of the notion of marriage, that full marriage is a special case of matrimony.

This, I claim, is how we should think of the relationship between belief and credence. There was a traditional, non-degreed notion: belief. This notion bundled together a number of conditions and consequences, some of which come in degrees. Credence was introduced by Ramsey and De Finetti as a generalization of belief, one that comes in degrees.

2. A partial history of credence

The previous section obliquely sketched a view of the relationship between the ordinary concept of *belief* and the technical concept of *credence*, but I have yet to offer reasons for accepting that view. In this section, I’ll give a genealogical argument for it: the actual history of our concept of credence parallels the fictional story of Freedomian degrees of marriage.

The standard³ contemporary theory of degrees of belief was developed as a solution to the problem of interpreting probability statements. The general idea that probabilities involve something subjective and belief-like is as old as probability theory itself (Hacking 1975 ch. 2), but the subjective interpretation of probability only fully emerged in the work of Frank Ramsey and Bruno de Finetti in the 1920s and ’30s. That is, it had long been understood that saying an event had a probability of x meant, in part, that one ought in some sense to believe to degree x that the event would occur—but until Ramsey and de Finetti, we did not have an adequate account of what it would mean to believe something to any degree other than zero, one, or one-half.

³The standard theory is not the only one. For some alternatives, see, e.g., Genin and Huber (2022 §§3.2–3.4).

Ramsey's and de Finetti's respective achievements were, in part, technical, and examining their respective representation theorems helps to see both what was missing in previous subjective interpretations of probability and some of the differences between Ramsey and de Finetti. Each aims to show that subjective probability can do a job we might ask it to do.

De Finetti's representation theorem addresses a problem for strict subjectivists—those who think, like de Finetti and unlike Ramsey, that subjective probability is the only kind.⁴ Suppose we have a coin of unknown bias; I say it's a fair coin, but you think it's a trick coin that will come up heads 3 times in 4. We might try to settle the dispute by flipping the coin many times, taking the ratio of observed heads as an estimate of the coin's bias towards heads. We carefully set up our coin flipper so that the result of one toss doesn't influence the result of the next. Over time, as we observe more and more tosses, your estimate of the coin's bias and mine get closer and closer to each other, and to the observed frequency of heads.

If we can appeal to both objective and subjective probability, this scenario is easy to make sense of. The coin's bias is the objective probability of heads on each flip. Since the outcome of one toss doesn't influence the outcome of the next, the tosses are *objectively* probabilistically independent. That is, the (objective) probability of heads on one toss is equal to its (objective) probability of heads conditional on the outcomes of the previous tosses. Your and my degree of belief that a flip will come up heads are subjective probabilities. Over time, our degrees of belief change, coming closer to the objective probability of heads. These subjective probabilities are *not* independent though: if they were, our estimate of the coin's bias would be unaffected by observing past results.

This points to two gaps to be filled for the strict subjectivist: we need something other than objective probability for our different *a priori* estimates to converge to *a posteriori*; and we need something weaker than probabilistic independence to capture the idea that each coin toss is a separate test of the coin's bias, unaffected by previous tests. De Finetti solves both problems by appealing to *exchangeability*: roughly, if you assign the same probability to x heads in y tosses no matter what order the heads and tails come in, your credences are exchangeable. De Finetti's representation theorem allows us to show both that exchangeability behaves in some important ways like independence and that if our credence functions are both exchangeable, then our estimates of the coin's bias will converge on the observed frequency of heads in the long run.

Thus, de Finetti's representation theorem gives a way for credences to do the work of objective probabilities in statistical inference. Ramsey's representation theorem, on the other hand gives a way for us to measure someone's credences.

Ramsey's representation theorem shows that if a person's preferences satisfy certain assumptions, then they contain enough information to determine what the person's utilities and credences must be.⁵ This addresses one main concern for the subjectivist: giving a procedure for

⁴For a lucid presentation of de Finetti's results and their consequences, see Gillies (2000 ch. 4).

⁵For more on Ramsey's representation theorem, see Bradley (2004), Meacham and Weisberg (2011), and Elliott (2017).

measuring a person's credences.⁶ Ramsey's representation theorem points to such a method, provided we can elicit someone's preferences and provided they satisfy Ramsey's assumptions. As both Ramsey and de Finetti recognized, this is a major obstacle for any subjective interpretation of probability would be making sense of numerical degrees of belief: "for if the phrase 'a belief two-thirds of certainty' is meaningless, a calculus whose sole object is to enjoin such beliefs will be meaningless also" (Ramsey 1926, 166).

Note that in taking this approach to credence, Ramsey is not introducing a new mental state distinct from belief, but generalizing an ordinary notion: "the degree of a belief is a causal property of it, which we can express vaguely as the extent to which we are prepared to act on it" (1926, 169). Jeffrey (1970, 172) famously claimed that "Ramsey sucked the marrow" from the notion of belief with the subjective interpretation of probability. In Jeffrey's hands, this view is part of a radical eliminativism where we give up *belief* as obsolete in favour of the more useful notion of *credence*. Without going as far as Jeffrey, we can still take seriously the idea that Ramsey (and de Finetti) intended to extract some core of the familiar notion of *belief* to introduce a generalization of that notion.

Notice also that Ramsey and de Finetti operationalize credence in terms of preferences (or betting behaviour); they do not identify credence with any introspectible feeling. Felt confidence, in particular, is not the same thing as credence for Ramsey or de Finetti. On the other hand, I quoted Moon (2017) above as objecting to the idea that credences are degrees of belief; along the way, Moon identifies credence with confidence. Eriksson and Hájek make a similar move in arguing that credence is a commonsense notion philosophers should take as primitive (2007, 209):

After all, we have various ways in English (and, we hazard to guess, every natural language) for conveying our degrees of belief. Think of the spectrum of phrases that we have at our disposal: "I'm certain that p ", "I'm almost certain that p ", "I'm extremely confident that p ", "I'm moderately confident that p ", "I'm fairly confident that p ", ... all the way down to their duals at the other end: "I'm certain that not- p ", and so on.

To be precise, what Eriksson and Hájek say here does not entail that credence and confidence are the same thing—all that is claimed is that self-attribution of confidence "conveys" one's degrees of belief.⁷ But it is very easy to slip from thinking confidence and credence are correlated (which is enough to justify the claim about how we convey our credences in ordinary talk) to thinking credence just is confidence. The latter identification, I claim, is a mistake, and a mistake widely made in contemporary philosophy. The standard understanding of credence from Ramsey, de

⁶De Finetti takes a more straightforward approach to measuring credences: betting ratios. Someone who believes p to degree x will regard as fair an exchange of x units (of money or utility) for a gamble paying one unit if p is true and nothing if p is false. Ramsey's approach allows us to avoid the problem of diminishing marginal utility of money.

⁷But Moon (2017 §2) quotes several other philosophers more explicitly identifying confidence with credence.

Finetti,⁸ and their successors does not identify credence with confidence or indeed any other introspectible feeling. Ramsey is quotable on this point (1926, 169):

We can, in the first place, suppose that the degree of a belief is something perceptible by its owner; for instance that beliefs differ in the intensity of a feeling by which they are accompanied, which might be called a belief-feeling or feeling of conviction, and that by the degree of belief we mean the intensity of this feeling. This view would be very inconvenient, for it is not easy to ascribe numbers to the intensities of feelings; but apart from this it seems to me observably false, for the beliefs which we hold most strongly are often accompanied by practically no feeling at all; no one feels strongly about things he takes for granted.

Summing up this section: credence was introduced by Ramsey and de Finetti as a generalization of belief, specifically by liberalizing the connection between belief and action; thus, the genealogy of the contemporary notion of *credence* gives us reason to understand credences as, literally, degrees of belief.

3. Objections

3.1 Divergent norms

Here's a reason for adopting dualism about belief and credence: their rational norms diverge. It's standard to suppose rational credences obey the probability calculus, but rational belief obeys deductive logic instead. But, as the preface and lottery paradoxes show, probabilistic coherence and logical consistency put incompatible demands on high credence and belief, respectively.

Suppose you have a ticket in a fair lottery, where you have no further information about the which ticket will win, and suppose your (rational) credences match the chance of each ticket winning. Then, for every ticket in the lottery, you will have very high credence that that ticket will lose; but you will also have very high credence that exactly one ticket will win. Suppose you (rationally) believe that your ticket will lose. By parity of evidence, you would be rational to believe of each of the other tickets that they will lose. But if you believe all of these things, then your beliefs entail that no ticket will win. Probability allows you to have high credence in something logic forbids you to believe.

One problem with this line of argument is that it presumes there is nothing more to belief than high credence. But multiple accounts of the relation between belief and credence have been offered which reconcile the rational norms on each. For example, take Hannes Leitgeb's stability theory (Leitgeb 2017). On Leitgeb's view, believing p requires both having high enough credence in p and having one's credence in p remain high should one learn certain other things. That is, one's credence in p conditional on q must remain high enough, where q is any proposition in

⁸De Finetti is perhaps a trickier case than Ramsey: Finetti (1931, 302, quoted in Galavotti 1991, p. 254) describes probability as a "psychological sensation [*sensazione*] of an individual". But de Finetti was also a committed operationalist: for him as for Ramsey, credence (or subjective probability) is "only explicable in psychologistic terms," but "it can only acquire a precise meaning through an operational definition" (Galavotti 1991, 242).

which one has high enough credence. (There are two occurrences of “high enough” in this formulation because there are two (possibly distinct) thresholds here.) The central formal result of Leitgeb (2017) is that, given some assumptions about the two thresholds, the set of propositions with stably high credence will be consistent and closed under logical consequence.

Or consider views where belief is identified with credence 1 (e.g., Clarke 2013, Greco 2015, Dodd 2017). Whatever the costs of such views, one of their central benefits is that if one’s credences are probabilistically coherent, then the set of propositions with credence 1 is logically consistent and closed.

I won’t try to persuade the reader here that either of these accounts of the relationship between belief and credence is correct. My point in this section is just that it is possible to say, all at once, that belief is a special case of credence, rational credences are probabilistic, and rational belief obeys standard deductive logic.

3.2 Moon’s anti-threshold condition

Finally, let me address another argument from Moon (2017) that belief does not come in degrees. Moon endorses the following definition of what it would mean for something to come in degrees (p. 770):

Degrees Analysis: X comes in degrees if and only if, possibly, there is some object $O1$ and some object $O2$ such that both $O1$ and $O2$ instantiate X , and $O1$ has more X than $O2$ does.

For example, take *wealth*: wealth comes in degrees, since we can find two objects (say, me and your favourite billionaire) who both instantiate *wealth*, but one has more wealth than the other. (I’ll let you guess who has more than whom.) *Wealth* is a determinable whose determinates are specific values: \$1, \$2, etc. On the other hand, *being a billionaire* is also a determinable whose determinates are a subset of the determinates for *wealth*: all the values from \$1 billion and up. But *being a billionaire* does not come in degrees. That is, while one billionaire might be wealthier than another billionaire, neither is *more* a billionaire than the other. This sort of example motivates the following principle (p. 772):

Anti-Threshold Condition: If $P1$ is a determinable that comes in degrees with a corresponding set $D1$ of determinates that are degree-ordered, $P2$ is a determinable with a corresponding set $D2$ of determinates, and $D2$ is a proper subset of $D1$, then $P2$ does not come in degrees.

Now suppose we plug *credence* in as $P1$ and *belief* as $P2$ here: then the antecedent of the conditional has it that there is a set of determinates for *credence*, a subset of which are also determinates for *belief*. For example, we might think the determinates for *credence* are real values between 0 and 1, and the determinates for *belief* are the values in this interval above some threshold. In that case, if the Anti-Threshold Condition is correct and credence comes in degrees, then belief does not come in degrees in Moon’s sense. Thus, credences would not literally be degrees of belief; credence would not be a generalization of belief in the sense I intend. But I’ll argue that the Anti-Threshold Condition is implausible, which we can see by paying attention to certain gradable expressions.

Moon (2017) does discuss some gradable adjectives in motivating the Anti-Threshold Condition, including *tall*. On Moon’s view, simple positive sentences like “S is tall” ascribe a non-gradable property *tall*, which does not come in degrees, but depends on a degreed property *height*. Comparative sentences like “X is taller than Y” ascribe a difference in degree of *height*, not *tallness*, to X and Y. Moon offers the following observation as a reason for this distinction between *height* and *tallness* (pp. 772–3): “It is true that, in that context, we could correctly say, ‘Billy is taller than Sandy,’ but such comparative predicates are not attributing the property *being tall*, since neither Sandy nor Billy need even *be* tall for that sentence to be true!”

But the latter claim about comparative sentences is true only for some gradable adjectives. In fact, this is one of the tests for whether a gradable adjective is, in Kennedy’s (2007) terms, a *minimum absolute*, *maximum absolute*, or *relative* one: For some gradable adjectives Φ , we can infer from X’s being more Φ than Y: (a) that X is Φ (minimum absolute); (b) that Y is not Φ (maximum absolute); or (c) neither (relative). Some examples from Kennedy (2007, 27–28):

- The floor is wetter than the countertop. \Rightarrow
 - The floor is wet.
- The floor is drier than the countertop. \Rightarrow
 - The countertop is not dry.
- Rod A is longer than rod B. \nRightarrow
 - Rod A/B is (not) long.

Wet, *dry*, and *long* are all gradable adjectives; *wet* is minimum absolute, *dry* is maximum absolute, and *long* is relative. *Tall*, likewise, is a canonical example of a relative gradable adjective. This explains the failure of the inference Moon points to:

- Billy is taller than Sandy. \nRightarrow
 - Billy is tall.

Substituting a minimum absolute gradable adjective for the relative gradable adjective *tall*, though, would undermine Moon’s point. So the failure of this inference doesn’t provide much support for the Anti-Threshold Condition.

Can we find another way to support the principle? The principle does seem to get Moon’s examples right: properties like *being a billionaire* or *being at least six feet tall* do seem binary, not degreed. But these are explicit threshold conditions; the Anti-Threshold Condition says that *all* properties which take a subset of another property’s degrees must be binary properties like this. That is, the Anti-Threshold Condition forbids us from having one degreed property whose degrees are a subset of another degreed property’s degrees.

Some ordinary predicates look like counterexamples. *Thirsty* is a degreed property; some but not all degrees of thirst satisfy *is parched*; yet one person can be more parched than another. Likewise for other intensified versions of gradable adjectives: *tall* and *towering*; *large* and *massive*; *open* and *agape*. I only say these look like counterexamples, because Moon’s concern is with metaphysics, not ordinary language. We could insist that in each of these cases, comparative judgments about

the intensified predicate really compare degrees of the more general predicate: to say *X is more parched than Y* is perhaps only to say that (*X* and *Y* are parched and) *X* is more thirsty than *Y*. I don't see a reason why we *must* so insist, though.

I suspect there is a case to be made that certain belief-attributing expressions of ordinary English are gradable (e.g., *is satisfied that*, *is confident that*,⁹ *is persuaded that*). But any claim about ordinary belief ascription is orthogonal to my main point here: I claim that *credence* is a theoretical concept explicitly introduced as a generalization of the ordinary concept of *belief*; Moon's Anti-Threshold Condition worries me as a premise in an objection to the possibility or coherence of the resulting doxastic metaphysics, not to its ordinariness. Given that we even have ordinary concepts with the structure forbidden by the Anti-Threshold Condition, I conclude that the objection to credences as degrees of belief fails.

4. Conclusion

I've argued that *credence* was introduced explicitly as a generalization of the ordinary concept of *belief*, such that credences deserve the name Ramsey and de Finetti originally gave them: "degrees of belief". There may be other belief-like things that come in degrees and are distinct from belief—it may be that dualism is true about belief and, say, confidence. But confidence is not credence; more generally, for any Φ , if we have reason to think that dualism is true about belief and Φ , we thereby have reason to think Φ is not credence. Credences are degrees of belief.

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Is belief credence 1? Depends on what you mean!

Julia Staffel

1. Introduction

In his opening piece, Roger Clarke argues that the notion of credence is a generalization of our ordinary notion of belief. In my reply, I will argue that the most plausible version of Clarke's claim – that believing something means having credence 1 in it in a context – requires making some modifications to the original framework of subjective probability in which the notion of credence was originally introduced.

I set up my discussion by distinguishing between the *mental states* we want to describe and study, and the different *conceptual frameworks* we can adopt to talk about them in our theories. I go on to defend a type of dualist view of our belief-like mental states: the states that let us represent something as true are distinct from those that let us represent something as uncertain. There is more than one way to represent these two attitude types in our philosophical theories. I argue that if we choose the popular representation of degrees of belief as precise numerical credences in the zero to one interval, then we should model all-or-nothing belief as a credence of 1 in a particular context. This view is revisionary, as it denies that credence 1 always represents certainty, and it also requires modifying our normative theories about how to change and update our beliefs and credences as we reason. I close by presenting a puzzle about how an agent's credences and beliefs should cohere with each other in a given context of deliberation.

2. Two questions about doxastic attitudes

When describing our mental states that we rely on to represent what the world is like, it is useful to distinguish between two questions: (1) What roles do these states play in our mental lives, i.e., what work do they do for us? (2) How can we represent these states in our theorizing so as to capture their key features? When these questions are not kept separate, a lot of confusion tends to ensue.

Regarding the first question: Most philosophers agree that there are two main ways in which we represent the world to ourselves with the aim of capturing it as accurately as possible. One of these ways simply involves treating things as true or not. When I treat some claim p as true, its negation is not (or at least not currently) a live option for me, I simply proceed as if p in my reasoning and action. If I treat neither p nor $not-p$ as true, then neither of them acquire the status of a premise in my reasoning. The second way in which we represent the world allows us to make finer-grained distinctions between the things we don't treat as true. For example, if you and I were participating in a 10-ticket lottery, and I had six of the tickets and you only four, I would think that you're less likely to win than me, and I wouldn't treat it as true that either of us is the winner until

the drawing settles it. In his opening essay, Clarke characterizes in some more detail the grounds for ascribing mental states of both types to people.¹⁰

Settling on a characterization of the roles that representational states play for us doesn't yet answer the second question: What is (or are) the best way(s) of modeling these states in our philosophical theories? Rather than naively adopting everyday concepts, philosophical accounts of a phenomenon tend to aim to adopt a more deliberate, and perhaps more useful conceptual scheme to represent it.¹¹

The state that lets us treat things as true is usually called belief, and its alternatives within its associated classificatory scheme are suspension, disbelief, and perhaps also the absence of any opinion whatsoever. This way of categorizing the states by which we treat things as true (or not) might not initially seem to be part of any technical philosophical apparatus. Rather, it seems quite similar to our ordinary folk-psychological notion of belief. On a closer look, however, it becomes apparent that our philosophical belief-concepts are not just a naïve adoption of an ordinary concept. For example, there has been discussion about how many contrasting states are needed in this classificatory scheme – is disbelieving p just the same thing as believing *not- p* ? Or do we need to make room in our classification schema for a distinct state of disbelief? Similarly for suspension – should it be categorized as its own type of state that contrasts with belief and disbelief, or is it just a belief with a certain type of content, e.g., that p is not settled?¹² Those questions are not answered by our everyday notion of belief, but can be important in certain contexts of philosophical theorizing about belief.

A further debate about how to model these on-off states in our philosophical theorizing centers on the question whether we need to distinguish between something like *strong belief* and *weak belief*. On this type of view, a classificatory scheme that includes only one type of belief lacks the descriptive resources to capture important distinctions between different types of beliefs and the roles they play. For example, strong, but not weak belief lets us treat something as true in reasoning, whereas weak belief underlies assertions such as “I think horse number five will win the race.” (see, e.g., Hawthorne et al. 2016, Dorst 2019).

In case of the second type of representational state, which allows us to treat things as more or less likely, it is more obvious that our classificatory apparatus for describing these states is a matter of choice, rather than simply being dictated by the features of the mental state we're theorizing about. Perhaps the most popular way of representing these graded representational states is by assigning real numbers between zero and one to them, so that larger numbers are associated with higher degrees of confidence. This kind of probabilistic representation was

¹⁰ We can also *suppose*, *conjecture* or *accept* that something is true, regardless of whether our evidence supports it. These are useful mental states for various purposes in reasoning, but they don't strictly speaking represent the world to us as *actually* being a certain way. I will set these states aside in what follows.

¹¹ The type of process by which we arrive at “tidied up” versions of concepts that are suitable for use in our theories is sometimes called “Carnapian explication”, since Carnap gave a compelling explanation of how to formulate scientifically useful concepts (Carnap 1950).

¹² See for example Smart (2020), McGrath (2021).

developed by Ramsey and De Finetti, as Clarke explains in his opening essay. While this numerical representation allows us to build simple and powerful mathematical models of people’s attitudes, subjective Bayesianism, as it is commonly called, is also frequently criticized for assuming an artificial level of precision that has no basis in the mental states that are being represented. People’s actual degrees of uncertainty are arguably much fuzzier and more coarse-grained than the precise decimals representing them in the Bayesian theory. Alternatives that try to stay closer to the degrees of (im-)precision manifested by these mental states include qualitative confidence orderings (Konek 2019), or imprecise probability models (Mahtani 2019).¹³ Others object to these broadly probabilistic representations and instead propose alternatives such as ranking theory and Dempster-Schafer theory (for an overview, see Halpern 2017).¹⁴ One’s choices in selecting a model depend in part on which aspects of the mental state one wants to be represented as accurately as possible, and which parts can be abstracted away from in order to make the models manageable.

The terminology used to describe these mental states and their representations in our theories is unfortunately not unified across the literature. Some authors use “doxastic attitudes” as a general term for the *mental states*, and then distinguish between beliefs (for the on-off states) and degrees of belief/confidence (for the graded ones). Others use “beliefs” as the general term, and then distinguish between full or outright beliefs (for the on-off states) and degrees of belief/confidence (for the graded ones). For the on-off states, there is usually no distinction being made between the terms used for the *mental states* and the terms used for our *representations* of them, perhaps because the relevant theories are often thought to be directly about the mental states. But in the case of degrees of belief, we’ve already seen that there are important differences between the mental states themselves and how they are captured in our models or theories. It is common to use “credences” or “subjective probabilities” for representations that use precise real numbers between zero and one, and “imprecise” or “fuzzy” or “mushy credences” for models that use probability sets or intervals. But this terminological distinction is not always made, and so people often use both “credences” and “degrees of belief” or “degrees of confidence” to refer to both the relevant mental states and their representations in our models.¹⁵

I don’t think it matters that much which terminology we choose, as long as we apply it carefully and consistently. For example, the question “Are people’s degrees of belief real numbers in the interval between zero and 1?” can have different answers, depending on what we mean. If we reserve “degrees of belief” for people’s actual mental states, then the answer is negative. But if we allow “degrees of belief” to *also* refer to entities in our models, then the answer is: yes, if we are talking about a probabilistic representation. As Titelbaum (forthcoming b) aptly observes,

¹³ Another possibility is that people have precise degrees of belief and noisy processing strategies. Thanks to Robert Rupert for pointing this out.

¹⁴ For a very insightful discussion of building *normative models* of people’s doxastic attitudes, see Titelbaum (forthcoming a).

¹⁵ Those who think that “confidence” is best understood as referring to a type of feeling tend to resist identifying it with a degree of belief, the possession of which arguably doesn’t have to *feel* like anything.

confusing mental states with their representations in our models leads some epistemologists to “complain that working with numerical credences is unrealistic, because agents ‘don’t have numbers in their heads.’ This is a bit like refusing to measure gas samples with numerical temperature values because molecules don’t fly around with numbers pinned to their backs.” In other words, criticisms of credence-based epistemological theories that point out that mental states representing uncertainty don’t generally involve numbers miss their target. Using a mathematical model of a certain phenomenon does not carry a commitment to the claim that the phenomenon itself inherently involves numbers in some way.

My preferred terminology, which I will use below, calls the on-off mental states “outright beliefs”, the graded mental states “degrees of belief” or “graded beliefs”, and their real-valued representations in our models “credences.” This differs a bit from Clarke’s terminology. He says that “credence” generalizes the ordinary notion of belief, but he doesn’t explicitly distinguish between terms that are used for mental states and terms that are reserved for their formal representations. He also uses “confidence” to refer to the *feeling* of confidence, which is not the same as a graded belief or credence.

Once we have settled on our terminology, some questions in the literature become easier to answer than we might have initially thought. Take Moon’s investigation of whether beliefs come in degrees, which Clarke discusses in his opening essay. In some of his arguments, Moon appeals to our intuitions about belief in order to argue that beliefs don’t come in degrees, only confidence does. But once we accept that there are two things that we can do with our representational mental states – treating things as true, and treating things as more or less likely – it becomes fairly obvious that the former type of state does not come in degrees, whereas the latter one has a graded element to it.¹⁶ Given that they both play similar representational roles in our thinking, it makes sense to think of them as two species of the same genus. Whether we want to call the ungraded state “full belief” or “belief” doesn’t matter that much. Once we’ve clarified our terminology, there are far more compelling questions to discuss about how the different types of belief states are related to one another, and how we should represent them in our theories. Clarke takes a stand on one of these interesting questions when he argues that “*credence* was introduced explicitly as a generalization of the ordinary concept of *belief*.” In the following, I will take a closer look at Clarke’s position and explore how we should understand it given the taxonomy I have introduced. I will argue that there is a plausible sense in which *credences* are a generalization of *belief*, but it matters how exactly we state the position.

¹⁶ Though as Moon and others have rightly pointed out, when someone treats something as true, they might do so more or less firmly, depending on how easily they would change their mind. Clarke agrees. The same can be said about degrees of belief as well, however. If I am highly (or moderately, or not at all) certain of something, my degree of belief may be more or less easily altered by new information or other factors. I believe this was first pointed out by Skyrms (1977).

3. Interlude: Are there really two types of states?

Some readers might be concerned at this point that I have smuggled some substantive assumptions about the nature of our mental states into my introductory setup. I said that some of our mental states let us treat things as true, and others let us treat things as uncertain, and I have also said (or at least heavily implied) that they are distinct. But isn't that contentious? Are these states really distinct, or are they just two versions of the same state? In the literature, readers might have encountered a variety of reductive views on which there is really only one type of state, and they might think that I am plowing right over these debates.

In the previous section, I was careful to characterize the two types of mental states as playing two mutually exclusive roles. One type lets us treat things as true. The other lets us treat things as uncertain. Since things that are being treated as true are not being treated as uncertain, the states that allow us to represent things in these distinct ways can't be identical. If this position is a kind of non-reductivism about outright belief and graded belief, I am all for it, and I think everyone else should be too (for an extended argument supporting this, see Weisberg 2020). However, this still leaves open a number of options for how we characterize these states in our theoretical frameworks.

One natural question to ask is: Which things do we treat as true? One possible view is that treating things as true requires certainty. If the states that let us treat things as true are outright beliefs, as I suggested above, then outright beliefs require certainty. This claim could be taken as a metaphysical statement, or a normative statement. On the metaphysical reading, we don't ever outright believe things that we're not certain of. This seems rather implausible. We treat many things as true in our reasoning and acting that we're not certain of. For example, suppose my partner said they would bring home Indian food for dinner. I now treat it as true that we're going to have Indian takeout, which is reflected in my reasoning. For example, I might infer that I don't need to get groceries or start cooking, that I have an extra hour to write, and so on. But am I *certain* that we're having Indian takeout? Surely not. I can't rule out any of the factors that sometimes interfere with our plans, such as the restaurant being unexpectedly closed, or my partner having car troubles. We can easily generate many more examples like this one.

On the normative reading of the claim, we never ought to outright believe (i.e., treat as true) anything we're not completely certain of. If we ever do so, then that's a rational failing. This claim is hardly more plausible than the metaphysical one. It's hard to see where the rational error is in outright believing all the ordinary things that are highly likely on our evidence, such as that our car is where we left it, that the supermarket will sell us milk and apples, or that my office has not been flooded in my absence. Further, it vastly simplifies our reasoning to treat these things as true, since we're not consumed with attending to small, but hardly relevant probabilities that things might be otherwise. To be fair, there seems to be something irrational about outright believing things that are too unlikely – many have argued that outright believing things that are less likely than 50% given our evidence is irrational. But that still leaves a lot of room for rationally believing things that are merely likely rather than certain for us.

How does this bear on the question of whether we should be monists or dualists about outright beliefs and graded beliefs? If it were correct that treating something as true was the same thing as being certain of it, and that this was the same as outright believing it, then this would give us an easy route towards a kind of graded belief monism. Outright believing something would be nothing over and above having the highest possible degree of belief. But if we accept that we can rationally hold outright beliefs in things we're not certain of, then this straightforward monist view of the relationship between outright and graded belief can't be correct. I'll explain below what I take to be a better alternative.

Another kind of monistic view one might suggest is a version of outright belief monism. This view claims that none of our mental states come in degrees, rather, they are all of the on/off kind. When we're uncertain about something, this is captured in the *content* of one of these ungraded states. On this view, the state ascribed to me when I am not sure about what my friend will make for dinner is an outright belief that they *will probably (as likely as not/probably not, etc.)* make Chinese food. By contrast, if I treat it as true that they are making Chinese food, the state ascribed to me is an outright belief that they *will* make Chinese food. On this view, none of our beliefs come in degrees (except in how firmly we're attached to them, but that's a different matter, see footnote 5).

I am not opposed to this kind of belief-monism, partly because I think it's not as monistic as people sometimes take it to be. First, I don't think this view is truly metaphysically monistic in the sense that it says that there is not a real difference between the states that let us treat things as true and those that let us treat things as uncertain. The outright belief that my friend is making Chinese food, and the outright belief that my friend is *probably* making Chinese food are distinct states on this view – they have different contents, after all! Further, accepting this view does not answer the question we encountered earlier in any way – what are the things that we can actually or rationally treat as true? Just the ones we believe to be certain? Or also ones we believe to be merely very likely? In other words, the question of the relationship between outright beliefs and graded beliefs still arises in a sense, except that it should now be stated as asking about the relationship between beliefs with probabilistic and beliefs with non-probabilistic contents.

I think what is really at issue when we wonder whether to be belief-monists in this sense is what representational framework we want to adopt for talking about beliefs in our philosophical theories. Do we want to model uncertainty with ungraded attitudes that have probabilistic contents, or with graded attitudes that have non-probabilistic contents? How we answer this question doesn't matter for most of the questions epistemologists care about. Few authors have explicitly addressed this, but Carr (2019) and Moss (2018) reach similar conclusions.¹⁷

In sum: The mental states that represent things to us as true and the mental states that represent things to us as being uncertain are clearly distinct. Saying they are really all degrees of

¹⁷ A more radical version of belief monism claims that almost all of our attitudes are outright beliefs with non-probabilistic contents. This type of view claims that degrees of uncertainty play a very minor role in our reasoning. For discussion, see Harman (1986), Staffel (2013), and Easwaran (2016). For an argument that it matters whether uncertainty is represented in the content or in the attitude, see Sturgeon (2015) and Jackson (2022). For an interesting version of the belief monist view, see also Moss (2018).

belief or credences is plausible if we think that outright belief requires certainty, but if we don't think that, credence monism no longer looks very appealing. Saying all doxastic states are outright beliefs, which differ in their contents, is not an implausible view. However, this view might ultimately be no more than a notational variant of a view that allows for graded beliefs, in the sense that any view about the epistemology of graded beliefs can equally well be expressed as a view about beliefs with probabilistic contents.

2. Clarke on generalizing the concept of belief

In his opening essay, Clarke argues that we should think of credences as a generalization of the ordinary concept of belief, which makes it appropriate to call them “degrees of belief.” He explains that this idea was developed by Ramsey and de Finetti, and that they thought of degrees of belief as a theoretical concept related to action that helped them formulate their theories of belief updating and decision making (Ramsey 1931, de Finetti 1937, 1974, Galavotti 1991). Clarke also sometimes states his view as the claim that “belief is a special case of credence.”

There is a certain interpretation of what Clarke says that I agree with, which I will now explain in more detail. Suppose we understand credences to be real-valued numerical representations of our mental states that lie in the interval between 0 and 1, as is standard in the theory of subjective probability, or subjective Bayesianism. By making this modeling choice for credences, we've now constrained our choices for how to model beliefs.¹⁸ If belief is a special case of credence, we must be able to represent it within this framework, i.e., by picking out either a precise credence or perhaps an interval of credences that represents the mental state of having an outright belief. But this turns out to be trickier than it might seem at first glance.

One option to consider is that we represent an outright belief in p as a non-extreme credence that is higher than 0.5 but less than 1. In light of our discussion above, it is easy to see that this is not an attractive option. If an attitude is represented with a numerical credence in p in this range, we usually also attribute to the agent a further attitude that is represented with a positive credence in $\sim p$, insofar as the agent is rational. And if an agent assigns positive credence to p and $\sim p$, we usually interpret this as uncertainty, i.e., the agent treats neither p nor $\sim p$ as true. Hence, this range of credences already has an interpretation that makes it ill-suited for representing outright beliefs (see also Sturgeon 2015).

Another option would be to identify outright beliefs with intervals or sets of credences that include some non-extreme credences and possibly go up to credence 1. However, it's not clear why that would be an improvement. We're looking for a representation of a state with which the agent treats things as true, and a set or interval of credences does not seem like a natural way of capturing this. By contrast, sets or intervals of credences are usually interpreted to represent an agent's attitude when the agent's uncertainty seems more “spread out” or amorphous (Mahtani 2019).

¹⁸ This illustrates the point from section 1 that in philosophical theorizing, we're not just working with our ordinary notion of belief. Instead, we're adopting a concept of belief that is useful and fitting within our theoretical framework.

This leaves the option of identifying outright belief with credence 1. I'll argue that this is the best option for making sense of the idea that outright belief is a special case of credence. However, readers might wonder how this fits with what I said above about the relationship between outright belief and certainty. I claimed above that we can believe things outright that we're not completely certain of, both as a matter of psychological fact, and from a normative point of view. But credence 1 is often interpreted as modeling complete certainty. So how can these two views fit together? Notice that there is nothing in the zero to one scale that forces us to interpret credence 1 as representing certainty. What it does force us to say – at least if we're buying into the standard view that rational agents should have probabilistic credences – is that if p gets credence 1, $\sim p$ gets credence 0. This means that no options competing with p for being actual get assigned positive probability. A fitting interpretation of this is that the agent treats p as true in their reasoning and decision making, because no other options get assigned positive probability. So why shouldn't we interpret credence 1 as standing in for outright belief, then? Why is it usually taken to mean certainty? One reason is that the certainty interpretation is very natural in light of the rest of the modeling machinery of subjective Bayesianism. A standard Bayesian norm is that agents should update on learning new information via conditionalization. This means that the agent assigns credence 1 to the newly learned information and redistributes their remaining credences accordingly by shifting them from the eliminated possibilities onto the remaining live ones. This way of updating leaves no room for going back – once a possibility or claim is assigned credence 1, there is no rational procedure in the standard framework for lowering it back down. This suggests that agents should not assign credence 1 to anything unless they are absolutely certain that it's true. Hence, if we want to model outright belief as credence 1, but deny that this means that the agent is certain of what they believe, we must abandon some of the standard Bayesian modeling framework that calls for the certainty interpretation.

I argued that we can believe things outright that we're not completely certain of. But what does that look like in our thinking? It would be incoherent (and perhaps even psychologically impossible) to treat the same claim p both as true and as uncertain within the same reasoning context (Staffel 2017). This can't be what the claim means that we can believe things outright of which we're not certain. Rather, it means that we can treat things as true in a wide range of reasoning contexts without treating it as true in every context. The latter state is what it means to be certain – if I am certain of p , I treat it as true in every circumstance. If I merely outright believe something, there can be more variation. For example, I believe that the bus that comes every weekday at 9.30am will get me to my office in time for 10am meetings. I rely on this outright belief on a daily basis in order to make my way to campus. But if, on a specific day, being late to campus would be catastrophically bad, I might not rely on it, but instead treat it as merely highly likely that the bus is on time, paying attention to the small degree of confidence I have that it might not be. Given the large cost of being late, this makes it rational for me to take an earlier bus that day. This example illustrates a more general point – there are many things we're not completely certain of, but they are close enough to being certain for most practical matters that we usually just treat them as true. It's only in special circumstances, or when our attention is specifically drawn to it, that we switch to reasoning that takes our uncertainty about the matter into consideration. By contrast,

when we're actually certain of something, we always treat it as true. Hence, the states of outright believing that p and being certain that p don't really differ from each other when we consider a particular context in which we reason with them. The difference only becomes apparent when we look at the agent's reasoning dispositions at large, across multiple different contexts. In other words, belief and certainty don't have the same modal profiles.

In light of this, our best option for representing belief in the framework of real-valued credences is to model them as credence 1, but with the further caveat that in other contexts, the agent might instead rely on a non-extreme credence in the same proposition, and should not be modeled as relying on a credence of 1 in that context. This means that in order to represent belief as a special kind of credence, we need to alter the part of the standard framework of subjective probability that says that if something receives credence 1, it always remains at credence 1, and we also have to reject the claim that a credence of 1 means that the agent is certain. This position has recently gained some popularity in the literature. Clarke is one of its main proponents – in fact, one of his papers is entitled “Belief is Credence 1 (in Context)” – but it has also been favored by authors such as Greco (2015, 2017), Salow (2019) and Staffel (2019).

3. Making things more complicated

The view on which *belief is credence 1 in context* is quite attractive, but it raises some new questions that have not been discussed in much detail in the literature. One interesting question asks in which circumstances we rely on an outright belief in a given reasoning context, and in which circumstances we rely on a high credence instead. (The difference is that an agent who reasons with a belief that p doesn't consider $\sim p$ as a live option, whereas an agent who reasons with a high credence in p does.) This question is related to, but not identical with the question of which beliefs we can rationally form. Take again the example in which I outright believe that there's a 9.30am bus that will get me to the office at 10. It seems that this is a rational belief for me to hold, but at the same time, I should not rely on it on days in which being late would be a disaster. Should we say that I still have the belief on those days, I just don't rely on it in reasoning? Or do I abandon the belief on those days and form it again later? I can't answer these questions here, but I encourage readers to think about them more.

Suppose we can answer the questions just raised, i.e., we know when it is rational to hold a belief, and when it is rational to reason with it. There is still a further unaddressed question: how do we manage outright beliefs and credences in actual reasoning contexts? The issue here is that in mixed reasoning contexts, which are constructed from both beliefs and credences, it's easy to end up with an incoherent mix of attitudes. Here's an example that illustrates the issue (Staffel 2019). You are wondering how likely it is to rain during an upcoming tennis match, but you don't remember the location of the match. It might be in New York or Boston or LA, for all you know. Your credences are as follows:

$$\text{Cr (NY)} = 0.48$$

$$\text{Cr (Boston)} = 0.48$$

$$\text{Cr}(\text{LA}) = 0.04$$

Of course, how likely it is to rain during the match depends on where it will take place. You have the following conditional credences reflecting this:¹⁹

$$\text{Cr}(\text{rain} | \text{NY}) = 0.7$$

$$\text{Cr}(\text{rain} | \text{Boston}) = 0.9$$

$$\text{Cr}(\text{rain} | \text{LA}) = 0.1$$

From these conditional credences, the rational credence that it will rain can be computed by using the total probability theorem.

$$\text{Cr}(\text{rain}) = \text{Cr}(\text{rain} | \text{NY}) * \text{Cr}(\text{NY}) + \text{Cr}(\text{rain} | \text{Boston}) * \text{Cr}(\text{Boston}) + \text{Cr}(\text{rain} | \text{LA}) * \text{Cr}(\text{LA})$$

$$\text{Cr}(\text{rain}) = 0.772$$

But suppose now that you're going to reason with the outright belief that the match will be either in Boston or in New York. After all, you assign very little confidence to the LA possibility. Then, what should your credence in rain be? If you don't treat LA as a live possibility in this reasoning context, then it doesn't seem coherent to assign a credence in rain that still factors in the probability of rain in LA. Given that you think Boston and New York are equally likely locations, you could instead take the average between the rain probabilities in Boston and New York, which comes out to $\text{Cr}(\text{rain}) = 0.8$.

$$\text{Cr}(\text{NY}) = 0.5$$

$$\text{Cr}(\text{Boston}) = 0.5$$

$$\text{Cr}(\text{LA}) = 0.04$$

$$\text{Cr}(\text{rain}) = \text{Cr}(\text{rain} | \text{NY}) * \text{Cr}(\text{NY}) + \text{Cr}(\text{rain} | \text{Boston}) * \text{Cr}(\text{Boston})$$

$$\text{Cr}(\text{rain}) = (0.7 + 0.9) 0.5 = 0.8$$

This procedure leaves your credences coherent in this context, because all the probabilities are dependent on treating only the New York and Boston locations as live possibilities.²⁰ As Clarke (2013) and before him Harsanyi (1985) have suggested, agents can ensure that their credences are

¹⁹ Read " $\text{Cr}(\text{rain} | \text{NY}) = 0.7$ " as "your credence that it will rain, given that the match is in New York, is 0.7."

²⁰ One might conjecture that the problem of having coherent credences and beliefs within a context only arises when we use subjective probabilities as our representational framework, and that it would disappear with a different modeling choice. I don't think this problem is a mere artifact of using a probabilistic representation of graded beliefs. We can pose the question of how to reason with live possibilities that are temporarily excluded from consideration in a general way, without mentioning precise probabilities.

coherent within a reasoning context if they employ a procedure I call “pseudo-conditionalization” when constructing the context. The standard rule of conditionalization says that if you learn that some claim q is true with certainty (i.e. $\text{Cr}(q)$ becomes 1), then your new credence in any claim p should be your old credence in p conditional on q , i.e. $\text{Cr}_{\text{new}}(p) = \text{Cr}_{\text{old}}(p | q)$. Pseudo-conditionalizing (PC) works in the same way, except that your credence in q becomes 1 not because you’ve learned that q is true, but instead because you’re treating q as true for the purposes of reasoning in that context. In other contexts, in which you don’t reason with an outright belief that p , you would instead reason with your *unupdated* credences.

This is an elegant answer to the question of how we manage to have coherent credences in each context of reasoning, given that we can switch back and forth between reasoning with an outright belief that p and a high credence in p . However, as I argue in Staffel (2019), it is questionable whether we really do, or even should use pseudo-conditionalization for managing our outright beliefs and credences when we construct reasoning contexts. The problem is that (PC) as a general procedure is very computationally demanding (although there could still be some instances of it that are not too complicated, like in our toy example above). There is good empirical evidence that human thinkers are at best approximate conditionalizers when they learn new information, and this data makes it seem fairly implausible that humans manage their credences and beliefs by PC.

One might suggest instead that PC is a norm of *ideal* rationality that tells humans how they *should* manage their beliefs and credences, even if doing so perfectly and consistently is in fact too demanding for them. Yet, this line of argument runs into a different problem. In thinking about outright belief and credence, one might wonder with Jeffrey (1970): Why have outright beliefs at all? Wouldn’t it be more precise to reason just with our credences? This question is commonly known as the *Bayesian Challenge*, and a popular answer is that we have outright beliefs in addition to credences in order to simplify our reasoning. Outright beliefs allow us to ignore possibilities that have low probability and are practically irrelevant, thereby making our reasoning more streamlined and efficient. Unfortunately, this plausible explanation of the function of outright belief is in tension with the claim that we should manage our outright beliefs and credences across contexts with a procedure like pseudo-conditionalization, or so I argue. If outright beliefs have the job of simplifying reasoning, it can’t be the case that to reason with them in a rational way, we have to manage them with a procedure that is so computationally demanding that it would wipe out the simplifying benefits of reasoning with them. More generally, if a particular norm is supposed to apply to some state or activity, the norm can’t be a true norm if it prevents the state or activity from serving its purpose or functioning correctly.

In light of this, it is an open question how human thinkers actually coordinate their outright beliefs and credences in constructing reasoning contexts, and it is also not clear what the rational or optimal way of doing so is. Perhaps simplicity in reasoning and coherence can’t be achieved simultaneously, and limited reasoners like us have to live with a bit of incoherence to make our reasoning manageable.

4. Conclusion

I've argued that when we think about the relationship between outright beliefs and graded beliefs, we can avoid confusion if we clearly distinguish between the mental states we wish to capture, and the conceptual framework we use to talk about them in our theories. I've defended a type of dualism about our mental states: states that let us represent something as true are distinct from states that let us represent something as uncertain. Further, I've argued that it is not psychologically or rationally required that we must be certain of the things that we treat as true in reasoning.

I showed that we have choices about the conceptual taxonomy we adopt to model these states in our theories. If we choose a model of our graded beliefs that represents them as real numbers between 0 and 1, then the best way to capture outright beliefs in this framework is to follow Clarke's slogan: belief is credence 1 in context. This helps us make sense of the idea that belief is a special case of credence, or credence generalizes the concept of belief. However, it also requires us to modify the standard interpretation of the Bayesian framework, thus departing somewhat from Ramsey's and de Finetti's original theories of graded beliefs.

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Two in the model, one in the head

Roger Clarke

I find a lot to agree with in Julia Staffel's essay. In this concluding reply, I'll offer resistance on behalf of monism. Let me start, though, by acknowledging some important points of agreement. Staffel's essay makes explicit the helpful distinction between mental states and representations of those states in our models, which I did not adequately distinguish in my opening essay. Henceforth, for clarity, I will reserve the terms "degree of belief" and "belief" for mental states, and "credence" and "acceptance" for representations of those states.²¹ Now let me more carefully state the view I've defended here: credence generalizes acceptance; degrees of belief are related to beliefs exactly as their names suggest—one is a subspecies of the other. This is a monist view on which belief and degree of belief are one thing, not two.

Elsewhere, I've defended the view that (in these terms) acceptance is credence one in context; my (2013) presents this as a reductionist (*ergo* monist) view of belief and degree of belief, but in fact the view is compatible with a dualist interpretation. Staffel's essay gets the relationship between these two views right, in my eyes: my commitment to monism is prior to my view that acceptance is credence one; the latter is the best way of making sense of the former.

Now, making credence context-sensitive in the way my (2013) suggests requires deviation from the standard framework of subjective probability and its standard interpretation. I justify such a deviation, in part, by suggesting the revised framework is less idealized, more closely mirroring actual human believers. This means I agree with Staffel's methodological sensitivity to empirical evidence about actual human psychology. If it turns out real people don't do what my models say they do, the models should be revised. So my goal in this reply is to offer resistance to the empirical evidence against (a) monism and (b) the modeling framework I defend in my (2013)—without retreating to the idea that the models are mere idealizations.

Let's start with the empirical evidence for dualism in Weisberg (2020), which Staffel cites approvingly. I agree that Weisberg very persuasively shows there is good news for the dualist in empirical psychology, but I am less convinced that the news is bad for monism. First, note that some of the studies Weisberg appeals to measure only reported confidence, which Ramsey rightly warns us not to confuse with degree of belief; others elicit explicit judgments of probability, which also should not be confused with degree of belief. (Probabilities are difficult both to compute and to interpret. Getting one's explicit judgments of probability to line up with one's actions is not a trivial task.) I don't want to take this response too far: it's not the case that all psychologists are confused about how to measure degrees of belief, or that the observations Weisberg reports is

²¹"Acceptance" seems to be the most popular term for something belief-like other than belief: it has been used to mean many different things, which should not be confused with the meaning stipulated here. See, for example, Weirich (2004).

irrelevant to participants' degrees of belief. But, although philosophers today are less happy to accept a conceptual analysis of degree of belief as betting behaviour than Ramsey and De Finetti were a century ago, we should not forget their reasons for rejecting the identification of degree of belief with confidence, or with explicit probability judgments.

Relatedly and more importantly, it's not clear to me that Weisberg's dualism must be read as dualism about belief and degree of belief, rather than about acceptance and credence—that is, as dualism about the phenomena rather than about our models. The metaphysical monist and dualist can agree that we should include both a binary and a degreed concept in our models, which are qualitatively different, subject to different norms, playing different roles, and so on. The metaphysical monist will *interpret* those concepts differently from the dualist, though: my kind of monist will understand the binary concept as referring to a state which is a special case of the state referred to by the degreed concept.

How should we choose between metaphysical monism and dualism if we can use the same modeling framework either way? Put another way: granted that we should include both belief and degree of belief in psychology's ontology, how should we think of the relation between the two? My answer: I don't understand what degrees of belief are if they aren't, literally, degrees of belief. We may want to reject Ramsey and De Finetti's radical pragmatism, according to which the defining feature of belief (and degrees of belief) is its connection with action, but then we need a replacement. Paraphrasing Ramsey: if our best theory says I should have a credence of $2/3$ in some proposition, and that does not simply mean being disposed to regard certain gambles as fair, we are owed an account of what it means. I do not see a plausible way of giving such an account without the result being a generalization of belief. (Again, I accept that confidence is not a generalization of belief, but confidence can come apart from degree of belief.)

The distinction between mental states and modeling frameworks also suggests two ways of interpreting the Bayesian Challenge: instead of asking "Why have outright beliefs?", we might ask "Why include acceptance in our models?" So to speak, the former is a challenge in designing cognitive agents, the latter in interpreting them, or in prescribing norms for them. Note that the modeling version of the Challenge is a problem both for dualists and for my sort of monist, since we differ only in how we interpret our models. My preferred response points to my preferred way of rejecting Ramsey and De Finetti's pragmatism: instead of taking belief to be entirely characterized by its connection with action, we also take it to be constitutively connected with assertion and reasoning, along the lines of the introduction to my opening essay. Then, if we identify acceptance with credence one, we claim that there are qualitative differences between acceptance and any other credence: only maximal degree of belief makes sincere assertion possible (see my 2018), and maximal degree of belief licenses different inferences than any non-maximal degree of belief. Those qualitative differences—the fact that maximal degree of belief behaves differently from any other degree of belief—is the reason for representing it with a distinct concept in our models.

Taking the Bayesian Challenge at the level of mental states, though, I find Staffel's objection to the pseudo-conditionalization (PC) response persuasive. Putting aside the qualms I raised above about just what is measured in the empirical studies she cites, I agree that (pseudo-)

conditionalization is too expensive to be plausibly carried out by human agents. But this is only the case for *probabilistic* conditionalization, to which I don't commit. The view I defend in my (2013) is a view of belief, not of rational belief; I don't commit to credences being probabilities. I am committed to one's posterior unconditional credence being one's prior conditional credence, but this is definitionally true: in my (admittedly unorthodox) modeling framework, the conditional prior credence $Cr(p|Q)$ is defined as what one's credence in p would be if one were in a context where Q captures one's beliefs. This may very well lead to violations of standard conditionalization—but violating standard update by conditionalization is a central feature of my view.

In short: so much the worse for conditionalization as a rational norm—but this needn't change our view of belief and degrees of belief. But this shows a gap that needs filling: if we don't say that rational humans update by PC, then what should they do instead? An appealing answer: they should approximate PC. In that case, we might want a theory of degrees of (in)coherence, so we can say how closely one approximates the Bayesian ideal. Happily, I can recommend to the reader a terrific recent book outlining just such a theory: Staffel (2019).

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