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Outright Belief

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Abstract

What is the relation between (a) '*full*' or '*outright*' belief and (b) the various *levels of confidence* that agents can have in the propositions that concern them? This paper argues for a new answer to this question. Decision theory implies that in making decisions, rational agents must treat certain propositions as though they were completely certain; but on most forms of decision theory, these propositions are not ones for which any finite agent could have maximal justification – the agent will clearly have less justification for these propositions than for elementary logical truths. Thus, every adequate model of a finite rational agent's belief-system must involve *two* set of credences – *theoretical* credences (the belief-states that keep track of how much justification the agent has for the propositions in question) and *practical* credences (the belief-states on which the agent bases her practical decisions). A full or outright belief in p can be defined as the state of being stably disposed to assign a *practical* credence of 1 to p, for all *normal* practical purposes. This definition allows for a kind of reconciliation between the pragmatist and intellectualist approaches in epistemology.

1. *Outright belief and levels of confidence*

Sometimes, we think of belief as a phenomenon that comes in *degrees* – that is, as consisting in the many different *levels of confidence* that an agent might have in various propositions. Sometimes, we think of belief as a simple two-place relation that holds between an agent and a proposition – that is, as what I shall here call *outright belief*.

Both ways of thinking of belief seem to be in evidence in everyday folk-psychological discourse. It is perfectly natural to say, for example, you are considerably *more confident* that Dublin is the capital of Ireland than that Dushanbe is the capital of Tajikistan. But it is also natural to say that you simply *believe* that Dublin is the capital of Ireland, without giving any further qualifications about how confidently or strongly you believe it. In general, we move back and forth easily between talking about what one simply believes, and talking about how confident one is of various propositions.

This raises the question: How are outright beliefs and levels of confidence related to each other? Philosophers have defended many different answers to this question. A few philosophers – such as Richard Jeffrey (1970) and Patrick Maher (1993, 152–155) – have taken an *eliminativist* stance towards outright beliefs, claiming that strictly speaking, outright beliefs do not really exist. A larger number

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of philosophers have attempted some kind of *reductive* programme. Thus, many philosophers – including Scott Sturgeon (2008) and Richard Foley (2009) – maintain that outright beliefs are reducible to levels of confidence, while other philosophers – such as Mark Kaplan (1996) and Brian Weatherson (2005) – claim that outright beliefs are reducible to facts about the relevant agent's preferences or utilities together with facts about the agent's levels of confidence. Others – most notably, Gilbert Harman (1986) – maintain that levels of confidence are reducible to facts about outright beliefs. Finally, a few recent philosophers – especially, Jacob Ross and Mark Schroeder (2012) and Jonathan Weisberg (2011) – maintain that neither of these two kinds of belief is reducible to the other.

In this paper, I shall propose yet another answer to this question. This answer has two main components. The first component is the thesis that there are in fact *two different kinds* of levels of confidence, which I shall call 'practical credences' and 'theoretical credences' respectively. The second component is the thesis that outright beliefs are reducible to facts about our *practical* credences – but not to facts about our theoretical credences.

2. *Outright belief and levels of confidence: Some distinguishing marks*

To begin our investigation of outright beliefs and levels of confidence, I shall enumerate some of the distinguishing marks of these two types of belief. I shall start by listing some of the distinguishing marks of outright belief.

First, we typically assume that a sincere *assertion* of a proposition *p* expresses an outright belief in *p*. If you meet someone who asserts that the capital of Uzbekistan is Samarkand, you will typically assume that if the speaker is sincere, then the speaker has an outright belief that the capital of Uzbekistan is Samarkand.[1]

Second, there seems to be a fundamental connection between outright belief and *knowledge*. Whenever an agent knows a proposition *p*, the agent must have an outright belief in *p*. If you know that the capital of Uzbekistan is Tashkent and not Samarkand, then you must have an outright belief that the capital of Uzbekistan is Tashkent and not Samarkand.[2]

Finally, there is a common way of using the term 'believe' – which we find in the philosophical literature on knowledge, when it is claimed that everyone who knows a proposition *p* must also believe *p* – such that when it is said simply that

[1] Compare Maher (1993, 131): "It is . . . *part* of the folk concept of belief that it is a mental state expressed by sincere, intentional assertions."

[2] Most traditional epistemologists claim that knowledge implies belief: for example, Nozick (1981, chap. 3) is typical in this respect. It seems clear that when these epistemologists claim this, they mean that knowledge implies *outright* belief (not just some more-or-less high level of confidence).

an agent "believes" a proposition p, what is meant is that have they have an outright belief in p.

I shall now list some of the distinguishing marks of levels of confidence. Your levels of confidence create an (at least partial) *ranking* of the propositions that you have beliefs towards. For example, you might have more confidence that $1 + 1 = 2$ than that Dushanbe is the capital of Tajikistan; so your levels of confidence rank the proposition that $1 + 1 = 2$ above the proposition that Dushanbe is the capital of Tajikistan.

We can illustrate this point by imagining an (at least partially) ordered collection of boxes: your levels of confidence in effect sort these propositions into these boxes. For example, the proposition that $1 + 1 = 2$ will presumably be sorted into the box at the very top of this ordered collection; the proposition that Dushanbe is the capital of Tajikistan is sorted into a box that comes somewhat lower in this ordering; the proposition that Dushanbe is the capital of France is sorted into a box that comes much lower down in this ordering; and the proposition that $1 + 1 = 5$ comes in the box at the very bottom of the whole ordered collection, along with other obviously false and absurd propositions.[3]

In fact, it seems that our levels of confidence may do more than simply rank propositions into an ordering of this sort. We can also make sense, not just of the thought that you are *more* confident of p than of q, but also of the thought that you are *much* more confident of p_1 than of q_1, or that you are only *slightly* more confident of p_2 than of q_2. In effect, we can at least sometimes compare *differences* in levels of confidence. For example, we can ask: Is the degree to which you are more confident of p_1 than of q_1 *greater* or *smaller* than the degree to which you are more confident of p_2 than of q_2?

This makes it plausible that it may be possible to *measure* an agent's levels of confidence, by means of some kind of *credence function*, which assigns real numbers to the various propositions that the agent has beliefs towards.[4] However, even if the agent's levels of confidence can be represented by means of such a credence function, we should not assume that this credence function will be a *probability* function. There are at least two ways in which the agent's credence function may fall short of being a full-blown probability function.

[3] The approach that starts out with the idea that our levels of confidence fundamentally consist in a *ranking* of the relevant propositions is explored by Joyce (1999, 91, 138, 256).

[4] For example, it would certainly be possible to measure your levels of confidence by means of a real-valued credence function (unique up to at least positive affine transformation) if they formed a *positive difference structure* of the sort that is defined by Krantz et al. (1971, chap. 4). Moreover, even if your levels of confidence did not form a complete difference structure, the facts about which differences in levels of confidence are greater or smaller than others would impose numerous *constraints* on the credence functions that could represent these levels of confidence, and so it would still be possible to represent your levels of confidence by means of a *set* of real-valued credence functions.

First, the credence functions that represent the agent's levels of confidence may not be probabilistically coherent. For example, there may be cases in which the agent assigns different levels of confidence to two propositions p and q, even though in fact p and q are logically equivalent. Later in this paper, I shall assume for the sake of argument that a perfectly rational agent's levels of confidence would always be probabilistically coherent; but I shall not be able to defend that assumption here. At all events, it is clear that not all actual agents are perfectly rational; so we should not assume that the credence functions that represent the confidence levels of actual agents must be probabilistically coherent in this way.

Second, a probability function is defined over an infinite propositional *algebra*. (For example, for every pair of propositions in this algebra, the algebra must also contain their disjunction and their negations, and so on.) I shall not assume that any real believer has a level of confidence in every proposition in a complete propositional algebra of this sort. There may be many 'gaps' – many propositions towards which the believer is totally 'attitudeless', and so has no level of confidence at all.

Many philosophers hold that human believers like you and me will inevitably have a set of levels of confidence that is 'gappy' in this way. Indeed, given that the core realization of our minds is found in the physical state of our brains, and given the limited information density of matter, it may be that it would be *impossible* for us to have a belief of some kind in every proposition in an infinite propositional algebra. I shall not attempt to address this issue here. However, even if it is possible for some human believers to have attitudes towards infinitely many propositions in this way, this paper will focus exclusively on *finite agents* – that is, on agents who only have attitudes towards finitely many propositions.

3. The functional role of these kinds of belief

To give an adequate account of the relationship between outright beliefs and levels of confidence, we need to get beyond these distinguishing marks, and to investigate the essential properties of these kinds of belief. I shall suppose here that one essential property of each type of mental state is its *functional role* – the role that the mental state is disposed to play in our thinking and reasoning.[5]

There is fairly widespread agreement among philosophers about the essential functional role of outright belief. If you have an outright belief in p, you will simply *take p for granted*, treating p as a starting point for further reasoning (including both practical and theoretical reasoning). You have a picture of the world that you rely on in all such further reasoning, and this proposition p is part of that picture of the world.

[5] I am not assuming any *reductive* form of functionalism here: I am assuming only that it is a *necessary* feature of each type of mental state that it is disposed to play a certain functional role. For more discussion of the various forms of functionalism, see Wedgwood (2007, chap. 8).

So far, this account of the functional role of outright belief is largely metaphorical. It might take a long time to give a complete account in less metaphorical terms. But it seems plausible that this functional role involves at least the following two elements – one of them concerning the role of outright beliefs in one's theoretical reasoning (that is, in the process of forming and revising one's beliefs and the like) and the other concerning the role of outright beliefs in one's practical reasoning (that is, in the process of forming and revising one's intentions about how to act).

On the theoretical side, the essential functional role of outright beliefs involves a disposition towards *deductive cogency*. Deductive cogency itself has two components. First, it involves a kind of *multi-premise closure*: if you deduce a conclusion from a certain set of premises, and (even after carrying out the deduction) you have an outright belief in each of those premises, then to be deductively cogent, you must have an outright belief in the conclusion as well. (The distinctive feature of this kind of multi-premise closure is that it allows for two different ways of responding to one's having carried out such a deduction – *either* by having an outright belief in the conclusion *or* by not having an outright belief in each of the premises. It is only if one has an outright belief in each of the premises even *after* carrying out the deduction that this kind of closure requires an outright belief in the conclusion.)

Second, deductive cogency involves a kind of *overall consistency*. Specifically, for you to be deductively cogent, the propositions in which you have outright beliefs must form a logically consistent set. It is part of the functional role of outright beliefs that they are disposed to conform to the requirements of this sort of deductive cogency.[6]

On the practical side, having an outright belief in p involves what John Hawthorne (2003, 29) calls "using p as a premise in one's practical reasoning". As Robert Stalnaker (1984, 15) puts it, "to believe [p] is to be disposed to act in ways that would tend to satisfy one's desires, whatever they are, in a world in which p (together with one's other beliefs) were true". I shall assume that this means something like the following: if the set of propositions in which you have outright beliefs is P, and together with your values, P entails that the *optimal* options for you to choose constitute a certain subset $\{A_k, \ldots A_m\}$ of the available options $\{A_1, \ldots A_n\}$, then you must be disposed to choose an option that belongs to that subset $\{A_k, \ldots A_m\}$. So, in particular, if P together with your values implies that A is the uniquely best available option, then you must be disposed to choose A.

[6] The overwhelming majority of philosophers who have written on this topic accept that the functional role of outright belief involves a disposition towards this sort of deductive cogency: see, e.g., Kaplan (1996, 95–98) and Frankish (2009, 80). There are a few dissenters, however: see especially Christensen (2004, chap. 4) and Sturgeon (2008, section 5).

What is the functional role of levels of confidence? For the purposes of this paper, a particular answer to this question will simply be assumed, at least for the sake of argument. This answer is based on an account of what it is for a believer's levels of confidence to be *rational*. The central idea is that the essential functional role of levels of confidence is that they are disposed to *approximate* to conforming to the requirements of rationality that apply to them.

Broadly speaking, we shall assume a version of the orthodox Bayesian account of what it is for an agent's levels of confidence to be rational – with the crucial amendment that it is not assumed here that the believer must have a level of confidence in *every* proposition in a whole propositional algebra. This Bayesian account of rationality has two components: one component is an account of *theoretical* rationality; and the other component is an account of *practical* rationality. (It will turn out to be important for our purposes to keep these two components clearly separated from each other.)

According to the Bayesian account of theoretical rationality, rational levels of confidence can be represented by a unique real-valued *credence function*, and this function must meet the following two requirements: first, it must be *probabilistically coherent*; and second, it must evolve in response to experience by means of some kind of *conditionalization*.[7] According to this account of theoretical rationality, this credence function may be partial or 'gappy' – that is, it may not assign a credence to every proposition in the whole propositional algebra. However, it is assumed that a perfectly rational agent's levels of confidence can be represented by a *unique* credence function: that is, for every proposition p that the agent has any attitude towards, all credence functions that can represent the agent's levels of confidence must assign the very same credence to p.[8]

According to the Bayesian account of *practical* rationality, rationality requires every agent's levels of confidence to constrain her *choices* and *intentions* in a certain distinctive way. Let us say that whenever one makes a certain choice, or has a certain intention, the object of one's choice or intention is an 'option'. Then according to this conception of practical rationality, there is some sort of 'value' that options might exemplify such that the rational agent's choices and intentions will always be for options that maximize the *expectation* of this sort of value – where the relevant 'expectation' is defined in terms of these levels of confidence. There are several tricky technical questions about how best to understand this sort of 'expectation', but the key idea is this: there is an appropriate 'partition' of 'states', such that in each of these states each of the relevant options exemplifies

[7] For a statement of such a Bayesian conception of theoretical rationality, see, e.g., Jeffrey (2004). This conception is undeniably controversial: for some critics, see, e.g., Plantinga (1993) and Pollock and Cruz (1999); unfortunately I shall not be able to answer these criticisms here.

[8] For an argument that the perfectly rational agent's levels of confidence must be 'sharp' in this way, see Elga (2010).

the relevant value to some precise degree; and if the agent's levels of confidence can be interpreted as assigning a *probability* to each of these states, an option's 'expected value' can be identified with the probability-weighted sum of the option's value in each of these states, weighting the value that the option has in each of these states by the relevant probability of the state.[9]

This account of the functional roles of these types of belief seems to create insuperable difficulties for the view that levels of confidence are reducible to outright beliefs. How could we reconcile the view that levels of confidence are reducible to outright beliefs with the idea that it is part of the essential functional role of levels of confidence to approximate to these broadly Bayesian requirements of rationality? It seems that the only way to achieve this reconciliation would be by identifying the state of having level of confidence n in a proposition p with an outright belief in the proposition that p has a probability of n.

However, this identification seems to imply that few if any human agents have *any* levels of confidence at all. The very idea of precisely measuring the probability of propositions did not emerge until the seventeenth century.[10] Brilliant agents such as Plato and Aristotle and the ancient Greek mathematicians never had any beliefs whatsoever in any proposition of the form 'Proposition p has a probability of n'. So, on this view, these agents never had any levels of confidence at all. Since this result seems incredible, we should conclude that if this account of the functional role of these types of belief is correct, then levels of confidence simply cannot be reduced to outright beliefs. Levels of confidence are either more fundamental than outright beliefs, or the two kinds of belief are equally fundamental and irreducible. At all events, from now on I shall simply set aside all attempts to reduce levels of confidence to outright beliefs; I shall turn to evaluating other theories of these types of belief instead.

4. A dilemma for non-trivial theories of outright belief

In fact, there is a glaring problem with the account of the functional role of outright belief that I gave in the previous section. The functional role that this account ascribes to outright belief in p is essentially identical to the functional role of having the *maximum possible* level of confidence in p. The functional role that this account ascribes to outright belief is certainly different from the functional roles of all levels of confidence that *fall short* of maximum confidence; but it does not differ from the functional role of maximum confidence.

On the theoretical side, the functional role that my account ascribes to outright belief involves deductive cogency: that is, it involves having an outright belief in

[9] For one version of this account of practical rationality, see Wedgwood (2011).
[10] This history was famously studied by Hacking (1975).

every proposition that you competently deduce from any set of propositions in each of which you have an outright belief, and not having outright beliefs in all members of any inconsistent set of propositions. But if your levels of confidence are probabilistically coherent, then the attitude of having maximum confidence in a proposition will also satisfy deductive cogency: you will have maximum confidence in every proposition that you competently deduce from any set of propositions in which you have maximum confidence; and the set of propositions in which you have maximum confidence will also form a consistent set.

On the other hand, for every level of confidence *n* that is lower than the maximum possible, the attitude of having the level of confidence *n* in a proposition will not in general satisfy deductive cogency. For example, suppose that your level of confidence in each member of a certain set of propositions is 0.9. If the set has 10 or more members, this set of propositions need not be logically consistent; and your level of confidence in the *conjunction* of any two or more members of this set may well be lower than 0.9.

On the practical side, the functional role that my account ascribes to outright beliefs involves treating the propositions in which you have outright beliefs as 'premises' in your practical reasoning – that is, in effect, basing your choices simply on your outright beliefs, and not on any levels of confidence that you have in any propositions that are incompatible with what you believe. This is obviously the same as the practical side of the functional role of the maximum level of confidence. Yet if your level of confidence in *p* is even slightly less than the maximum possible, there will be perfectly normal situations in which you would base your choices on your level of confidence in propositions that are incompatible with *p*. For example, consider a situation in which the available options do not differ in value in any way if *p* is true, but differ enormously in value if *p* is false; in this case, you would base your choice on your level of confidence in the *negation* of *p*, not just on your level of confidence in *p*. So again, if your level of confidence in *p* is even slightly less than the maximum possible, your level of confidence in *p* will not have the functional role that my account ascribes to outright belief.

In this way, my account of the functional roles of these kinds of belief differentiates outright belief from all levels of confidence that fall short of the maximum possible, but it does not differentiate outright belief in *p* from the attitude of having maximum confidence in *p*. In this way, my account of this functional role suggests that having an outright belief in *p* is a way of having full confidence in *p* – in other words, a way of treating *p* as certain.

This is not an idiosyncratic feature of my account. The phrases which philosophers typically use to describe the state of having an outright belief in a proposition *p* – phrases such as 'taking *p* for granted' or 'treating *p* as though it were true' – all seem to imply that having an outright belief in *p* involves treating *p* as though it

were (for all intents and purposes) *certain* – that is, treating *p* as though one had maximum confidence in it.[11]

Yet we all seem to have outright beliefs in propositions of which we are *not* maximally confident. For example, you can surely have an outright belief both in 'Dushanbe is the capital of Tajikistan' and in '1 + 1 = 2', even if you have *less* confidence in the former than in the latter. But if you have *less* confidence in 'Dushanbe is the capital of Tajikistan' than in '1 + 1 = 2', you cannot have *maximum* confidence in the former.

Indeed, virtually all philosophers who have explored the relationship between levels of confidence and outright belief assume that it must be possible to have outright beliefs in propositions of which one is not maximally confident. They have good reason for assuming this. In everyday speech, 'I believe that *p*' seems to be a distinctly weaker claim that 'I am certain that *p*'. Moreover, it seems that unless it is possible to have an outright belief in propositions of which one is not maximally confident, the notion of an outright belief will effectively be *trivialized*: it would simply be the notion of the highest possible level of confidence, not a notion that plays any distinctive and interesting role of its own in our thinking about agents.

However, non-trivial theories of outright belief face a dilemma. On the one hand, theorists who give reductive accounts of outright belief are forced to *deny* that the functional role of outright belief really is what it seems to be. On the other hand, those who recognize both outright belief and levels of confidence as equally fundamental and irreducible types of belief seem committed to the conclusion that having non-trivial outright beliefs involves a form of *incoherence* – in effect, the incoherence of simultaneously treating the relevant propositions as though they were both certain and not certain.

The best-known attempts to reduce outright beliefs to levels of confidence all seem to be impaled on the first horn of the dilemma. This is particularly clear with versions of the *threshold* view of philosophers such as David Christensen (2004) and Scott Sturgeon (2008) – that is, the 'Lockean' view that to have an outright belief in a proposition *p* is to have a level of confidence in *p* that exceeds a certain threshold *r*. These views more or less explicitly imply that the functional role of outright beliefs is not, strictly speaking, the same as the functional role of maximum confidence.

Weatherson (2005) takes a slightly different approach, attempting to reduce outright beliefs to facts about the agent's preferences as well as her levels of confidence. Weatherson's account comes closer to implying that outright belief has the functional role that it seems to have: his account implies that an agent who

[11] This is left implicit in most philosophers' accounts of outright belief. The main exception is Levi (1980), who insists that to have an outright belief in a proposition *p* is to have credence 1 in *p*.

has an outright belief in *p* has the same preferences over options as she would if she had maximum confidence in *p*; and at least if certain (in my view, rather questionable) assumptions about the agent's preferences are true, the agent's outright beliefs will also conform to a certain closure principle.

It does not follow, however, that Weatherson's account vindicates the thesis that outright belief really has this functional role. The functional role of a type of belief is a matter of the *dispositions* that characterize this type of belief, and the notion of a disposition is a causal or explanatory notion. According to Weatherson's account, the explanation of *why* an agent has the preferences that she has does not appeal to the agent's disposition to use the propositions that she has outright beliefs in as "premises in her practical reasoning". Instead, this explanation appeals to the functional role of preferences and levels of confidence, and to the fact that the agent has levels of confidence both in the propositions that she has outright beliefs in and in other incompatible propositions as well. Similarly, the explanation of why the agent's outright beliefs conform to the closure principle does not appeal simply to the disposition to conform to the requirements of deductive cogency, but rather to certain assumptions about the agent's preferences, as well as to the functional roles of preferences and levels of confidence.[12] So Weatherson's approach also fails to vindicate the thesis that the functional role of outright belief is what it seems to be.

On the other hand, the theorists who accept that outright belief has the same functional role as the maximum level of confidence are impaled on the second horn of this dilemma – they seem to be imputing a kind of *incoherence* to all agents who have outright beliefs in any propositions of which they are not maximally confident. Indeed, the threat of incoherence is obvious: by having an outright belief in a proposition *p* of which one is not maximally confident, one is in a way simultaneously treating *p* as though it were certain and also treating *p* as though it were not certain.

It is this apparent incoherence that lies behind the notorious *lottery paradox* of Henry Kyburg (1961). Suppose that one carries out a multi-premise deduction. Then treating the premises as though they were certain would commit one to treating the conclusion as though it were also certain – while treating the premises as though they were not certain would in many cases permit one to have *less* confidence in the conclusion than in *any* of the premises.

In fact, however, the incoherence that concerns us will arise even in cases of *single-premise* inference. According to my account of the functional role of outright belief, if you deduce q_1 from *p*, and even after performing this deduction, you

[12] In other words, even if Weatherson's account implies that all agents who have an outright belief in *p* have the same preferences as they would have if they really treated *p* as certain, it does *not* entail that they *reason* in the same way as they would if they treated *p* as certain. On this point, compare Ross and Schroeder (2012, section 2).

still have an outright belief in p, you will be disposed to have an outright belief in q_1 as well. But 'deducing' q_1 from p is effectively inferring q_1 from p in a way that is sensitive to the fact that the conditional probability of q_1 given p is 1. We should also consider how you will respond to inferring a proposition q_2 from p if you have an outright belief in p, but the conditional probability of q_2 given p is slightly less than 1.

For example, suppose that you have an outright belief in p, and you infer q_2 from p, while being sensitive to the fact that the conditional probability of q_2 given p is 0.99. Moreover, suppose that even though you have an outright belief in p, you do not have a maximal level of confidence in p – instead, your level of confidence in p is just 0.9. Still, we are assuming that having an outright belief in p involves treating p as though it were (at least for all intents and purposes) certain. So, how can it be coherent for you to continue to have a confidence level of just 0.891 in q_2 when you are effectively treating p as though it were certain, and you are sensitive to the fact that the conditional probability of q_2 given p is 0.99? Suppose that you simultaneously infer both q_1 and q_2 from p, while having an outright belief in p, and being sensitive to the facts that the conditional probability of q_1 given p is 1, and that the conditional probability of q_2 given p is 0.99. Surely you should now treat q_2 as though your credence in q_2 were (for all intents and purposes) 0.99, not as though your credence were just 0.891. After all, you treat q_1 as (for all intents and purposes) certain – just because the conditional probability of q_1 given p is 1. It is surely incoherent to treat q_1 and q_2 so differently in this way. So, on this view, having an outright belief in a proposition in which one has a non-maximal level of confidence seems to involve an unavoidable incoherence.

This seems to me to be a grave problem with this view. Nonetheless, we have seen problems with all of the alternative approaches as well. So we seem to need a new approach. Somehow this new approach must allow that it can be perfectly coherent to have an outright belief in a proposition p, even if one is not maximally confident of p, and even if, in some crucial way, having an outright belief in p really does involve treating p as if it were (for all intents and purposes) certain.

5. The solution to the dilemma

To solve this problem, I propose, we should recognize that in many cases, an agent's belief-system can only be adequately represented by *two* systems of credences – call them the agent's *theoretical credences* and the agent's *practical credences*. Both of these two kinds of credences come in degrees. The core distinction is this: theoretical credences represent the way in which the agent registers, or keeps track of, the amount of justification that she has in favour of the relevant propositions, while practical credences are the credences on the basis of which the agent maintains and revises her intentions about how to act.

How exactly could it be that "theoretical credences represent the way in which the agent registers, or keeps track of, the amount of justification that she has in favour of the relevant propositions"? Presumably, if you rationally have a greater theoretical credence in *p* than in *q*, that is the way in which you register the fact that you have *more justification* for *p* than for *q* – or as many philosophers would put it, the fact that your *evidence* gives more *support* to *p* than to *q*.

More precisely, I suggest, your theoretical credences are disposed to approximate to the requirements of *theoretical* rationality listed in Section 3. These credences are not only disposed to be probabilistically coherent; they are also disposed to change in response to experience, and the changes dictated by experience are propagated throughout the whole set of credences by means of some kind of conditionalization. These are the only kinds of changes in one's theoretical credences that are involved in these theoretical credences' essential functional role.

On the other hand, your *practical* credences represent the beliefs or doxastic states on the basis of which you maintain, form and revise your *intentions* for *action*. These practical credences are disposed to approximate to the requirements of *practical* rationality listed in Section 3. That is, these practical credences are disposed to constrain the agent's intentions, in such a way that those intentions tend to maximize the appropriate kind of expected value, when the relevant kind of 'expectation' is defined in terms of these practical credences.

You can have one set of practical credences for the purposes of making one decision, and a *different* set of practical credences for the purposes of making another decision. For the purposes of making most decisions, I treat it as though it were quite certain that Dublin is the capital of Ireland. However, if I am offered a bet that pays $1 if Dublin is the capital of Ireland and results in my being tortured horribly to death if Dublin is not the capital of Ireland, I will probably base my decision on a different set of practical credences, in which it is not treated as certain that Dublin is the capital of Ireland. (It even seems possible for an agent who is engaged in 'multi-tasking' to make two decisions at the same time, basing one decision on one set of practical credences, while basing the other decision on a second set of practical credences.)

When one has a practical credence of 1 in *p*, one is in effect treating *p* as though it were *practically certain*; when one has a theoretical credence of 1 in *p*, one is in effect treating *p* as though it were *theoretically certain*. On the face of it, there need be no incoherence in simultaneously treating a proposition *p* as though it were practically certain and also treating *p* as though it were not theoretically certain. The two kinds of doxastic or credal attitudes towards *p* do not conflict with each other, because they play fundamentally different roles: the state of being practically certain of *p* plays the role of guiding the way in which one maintains and revises one's intentions about how to act, while the state of being theoretically uncertain of *p* plays the role of registering the fact that one does not have the

highest possible degree of justification for *p*. In this way, we can resolve the dilemma that confronted us in the previous section.

This distinction between theoretical credences and practical credences can now be used to give an account of the nature of outright belief: an outright belief in *p* is the state of being *stably disposed* to have a practical credence of 1 in *p*, for at least all *normal* practical purposes.

It might be suggested that to believe a proposition *p* is simply to treat *p* as though it were practically certain. But that suggestion would overlook the fact that believing a proposition is an essentially *dispositional* state, while 'treating' a proposition *p* in a certain way is an occurrent process of thinking or reasoning with *p*. This is why I propose instead that having an outright belief is a state of being stably *disposed* to treat *p* as though it were practically certain.

Return to the example that we have just considered – the case in which you are offered a bet that will pay $1 if Dublin is the capital of Ireland, and will result in your being tortured to death if Dublin is not the capital of Ireland. In this case, it would be natural for you to say, "Look: I'm not going to take this bet. Even though I definitely believe that Dublin is the capital of Ireland, I'm not so fantastically confident of that to make it rational for me to take this insane bet!"[13]

It seems to me that this is the natural response for you to make in this case because for all *normal* practical purposes, your practical credence in the proposition that Dublin is the capital of Ireland is 1; this is why you count as believing *p*. But for the highly *abnormal* purpose of deciding whether to take this bet, your practical credence is less than 1.

At all events, this seems to me the best account of the state of outright belief: it can explain why it seems that outright belief in *p* has the functional role of credence 1 – because outright belief really does have the functional role of (being disposed to) have (practical) credence 1 in *p*. At the same time, it also makes it possible for an agent to have an outright belief in propositions of which she is not (theoretically) certain, without lapsing into any of the troubling forms of incoherence that we explored in the previous section.

6. Why finite agents need both practical and theoretical credences

Even if it is *possible* for some agents to have both practical and theoretical credences, of the sort that I described in the previous section, why should we think that any *actual* agents have two systems of credences in this way? In this section, I shall argue that finite agents – that is, agents whose belief systems are, as I put it above, 'gappy' – can be rational *only if* they have both practical and theoretical credences. First, I shall argue that to be rational, a finite agent must have practical

[13] I owe this point to Jacob Ross (personal communication) – although the general idea seems to be implicit in Ross and Schroeder (2012).

credence of 1 in some propositions for which she does not have the highest possible degree of justification – that is, propositions for which she definitely has less justification than for elementary logical truths and the like. Then I shall argue that to be rational, a finite agent must also have a theoretical credence of *less* than 1 in such propositions. If these arguments are correct, then rationality requires all finite agents to have both practical and theoretical credences.

My argument for the first step hinges on the definition of the decision-theoretic notion of a choice's 'expected value'. Within many forms of decision theory – including both causal decision theory and the 'benchmarks theory' that I have defended elsewhere (Wedgwood 2011) – the notion of a choice's 'expected value' is defined in terms of a *partition* of *states of nature*.

A 'state of nature' is a state of affairs that has the following two features: first, it is utterly *beyond the agent's control* which state of nature actually obtains; and second, each state of nature is sufficiently *detailed* to determine exactly how good each of the available acts would be if it were performed in that state of nature. To fix ideas, I shall follow David Lewis (1981) in conceiving of these states of nature as *conjunctions of non-backtracking counterfactuals* – where each of these counterfactuals has the form 'If I did act A_n, outcome O_m would result'. On this interpretation, states of nature are effectively propositions, and so we can talk of conjunctions, disjunctions and negations of states of nature, and so on.

Admittedly, there is one well-known approach to decision theory – the *evidential* decision theory (EDT) of Richard Jeffrey (1981) – that does not need to appeal to a partition of states of nature, and can define the notion of a choice's 'expected value' in terms of any partition whatsoever. I shall assume here that EDT is false, and that the correct decision theory (whatever exactly it is) will appeal to a partition of states of nature in this way.[14]

The crucial point here is that to say that a set of states of nature forms a 'partition' is to say that the relevant agent is *certain* that *exactly one* of these states of nature obtains. In other words, the relevant agent must be *certain* of the *disjunction* of these states of nature, and she must also be certain of the *negation* of the *conjunction* of any pair of these states of nature.

Intuitively, however, it seems clear that a disjunction of such states of nature will never be the kind of proposition for which an agent whose system of beliefs is 'gappy' has as much justification as for the most elementary logical truths. In particular, the disjunction of these states of nature will not itself be a logical truth – not even an instance of the law of excluded middle '$p \vee \neg p$'. The *negation* of a

[14] The argument for the conclusion that finite agents will need to rely on outright beliefs in their decision making that I give here is broadly similar to an argument that is given by Ross and Schroeder (2012, section 1.3). However, their argument is at least slightly less precise than mine: one way in which their argument is less precise is that they do not make it clear that the argument has to assume that the correct theory of rational decision is not EDT, but a theory that appeals to 'states of nature' or the like.

state of nature is not itself a state of nature: the negation of a conjunction of non-backtracking counterfactuals is not itself a conjunction of non-backtracking counterfactuals (it is effectively a disjunction of negations of non-backtracking counterfactuals, which is quite another thing). So, even though the agent has the highest possible degree of justification for the proposition that either the state of nature or its negation obtains, this is not enough for having such a high degree of justification for a disjunction of *states of nature*.

For example, consider a simple case, where I am deciding whether to travel from London to Oxford by bus or by train. I may just consider two states of nature: one state of nature S_1, in which the traffic on the roads is light, and so taking the bus would result in my arriving in Oxford after a journey of about an hour and a half, and a second state of nature S_2, in which the traffic on the roads is heavy, and so taking the bus would take at least two hours. But I certainly do not have as much justification for the disjunction of S_1 and S_2 as I have for the simplest logical truths: after all, my evidence makes it quite clear that there is a non-zero chance that the bus will crash on the motorway, with the result that I never reach Oxford at all. Nonetheless, for the purposes of deciding whether or not to catch the bus or the train, I do not consider the state of nature in which the bus crashes on the motorway. Indeed, since my belief system is 'gappy' in the way that I have described, I may have no doxastic attitude whatsoever towards the proposition that the bus will crash: I may be totally 'attitudeless' towards that proposition; and even if I do consider the possibility that the bus will crash, there will inevitably be other possibilities that I do not consider – such as that the bus will be hi-jacked by terrorists or the like.

Thus, if the agent is *ever* to be capable of guiding her choices and intentions by this sort of expectation, the relevant partition will have to consist in a set of states of nature such that the agent treats the disjunction of these states of nature as *practically certain*, even though she does not have the highest possible degree of justification for this disjunction.

Arguably, a similar issue arises at another point in the decision-making process. It is arguably necessary for agents to treat it as practically certain that each of the options that they are choosing between is *practically available* – roughly in the sense that if they choose the option, they will execute the choice and act accordingly. But the *availability* of an option is surely another proposition for which a finite agent will never have the maximum degree of justification. (There is always a remote possibility of suddenly dying, or being totally paralysed, in the time lag between making and executing the choice.) So here too it seems that rational agents will need to be practically certain of some proposition for which they have less than the highest possible degree of justification.

As I shall now argue, however, although a rational finite agent needs to be practically certain of some propositions of this sort, she also needs *not* to be

theoretically certain of them. That is, she needs to register, or keep track of, the fact that she does not have the highest degree of justification for these propositions.

Suppose that you start by being practically certain of a proposition *p*, but then the practical stakes change – for example, because you are offered a bet that pays $1 if *p* is true, and results in your dying a horrible death if *p* is false. (Suppose that you know that the proposition *p* was chosen at random, so that being offered this bet does not itself change the degree of justification that you have for *p*.) If you are rational, you will not accept the bet, because in making this decision, you will shift to a new set of practical credences, which do not involve being practically certain of *p*. But it seems that some kind of beliefs must guide you in shifting from one set of practical credences to another in this way – where these guiding beliefs must have been present *before* this shift in your practical credences, and must include some kind of belief in the very proposition *p* that is at issue. It seems that these guiding beliefs cannot be your pre-existing practical credences – since those credences involve treating *p* as if it were certain, and so cannot allow you to envisage the risks that would be involved in believing *p* if *p* is false. Instead, these guiding beliefs must include some non-maximal level of confidence in *p* itself.

Intuitively, for this sort of shift to be rational, these guiding beliefs must be a set of credences that keep track of the degree of justification that the agent has for each of the propositions involved. In effect, they must be what I have called theoretical credences. This seems to show that to be rational, finite agents need theoretical credences as well as practical credences: for finite agents like us, both practical and theoretical credences are indispensable.

7. What practical credences will a rational agent have?

According to the argument that I have just given, the agent's theoretical credences – presumably including credences about the practical stakes in the practical situation at hand – can somehow guide a rational agent to shift from one set of practical credences to another. To be confident that this argument is correct, we should give a more detailed account of how exactly a rational agent will shift from one set of practical credences to another in this way.

One suggestion that might be considered is that the rational agent will have a set of practical credences that *maximizes expected value* (when the relevant 'expectation' is defined in terms of the agent's *theoretical* credences). But this suggestion has a fatal problem. Practical credences that maximize expected value in this way might include a practical credence of 1 in a proposition *p* such that the agent is *theoretically* almost *certain* that *p* is *false*.

If you treat a proposition *p* as though it were certain, for the purposes of making a given decision, even though in fact you are theoretically almost certain that *p* is false, then your attitude towards *p* is surely not a state of belief at all. It

seems rather to be the state that Michael Bratman (1992) has called 'acceptance'. For example, for the purposes of planning your household budget, you might 'accept' that the repairs that you have to carry out to the roof of your house will cost at least $25,000 – even though you are theoretically almost certain that the roof repairs will cost less than that. Or to take another example, which is due to Keith Frankish (2009, 86), a lawyer might "accept that their client is innocent for the purposes of defending them" – even if the lawyer is in fact theoretically almost certain that their client is guilty.

In general, it seems that no rational believer could *ever* have a practical credence of 1 in a proposition *p* in which her theoretical credence is less than 0.5. This is a point that our account of which practical credences the rational agent will have must somehow explain.

In general, I propose, *any* kind of belief in a proposition *p* – including both theoretical and practical credences in *p* – is rationally required to be guided purely by certain distinctively *epistemic* values. Very roughly, being guided by these distinctively epistemic values involves pursuing the goals of *believing p if p is true* and *not believing p if p is false*. Practical considerations (such as the costs and benefits at stake in the agent's situation) only make a difference to the practical credence that the agent has in *p* by making a difference to the way in which these two goals – *believing p if p is true* and *not believing p if p is false* – are *balanced* against each other.

For example, if the goal of believing *p* when *p* is true is weighted relatively heavily, while the goal of not believing *p* if *p* is false is not weighted particularly heavily, then this weighting seems to favour having practical credences that are more *adventurous* and *extreme* (that is, closer to 0 and 1) than one's theoretical credences. On the other hand, if the goal of not believing *p* if *p* is false is weighted very heavily, and the goal of believing *p* if *p* is true is not weighted especially heavily, then this alternative weighting seems likely to favour practical credences that are more *cautious* and *non-committal* (that is, closer to 0.5) than one's theoretical credences.[15]

We can articulate this idea more precisely by introducing the idea of the 'epistemic disvalue' of a credence. A credence's 'epistemic disvalue' is a measure of the extent to which it *falls short* of achieving these two goals – by involving either (i) *insufficient* credence in a *true* proposition or (ii) *excessive* credence in a *false* proposition. In general, if *p* is true, then the *higher* one's credence in *p* is, the *lower* the epistemic disvalue of one's practical credence in *p*; while if *p* is false, the *higher* one's credence in *p*, the *greater* the epistemic disvalue of one's practical credence in *p*. More specifically, let us assume that the epistemic disvalue of one's

[15] This feature of the idea of "pursuing the truth" seems to have first been noticed by James (1979).

credence in *p* is an increasing function of the *distance* between that credence and *p*'s actual truth-value.[16]

This notion of the 'epistemic disvalue' of an agent's credence in a particular proposition *p* can be generalized to obtain a more general notion of the epistemic disvalue of a whole *set* of credences. So long as we are only comparing different possible sets of credences in the *same* set of propositions, we may simply take the epistemic disvalue of each possible set of credences to be the *sum* of the epistemic disvalues of all the individual credences in that set.[17]

With this notion of the 'epistemic disvalue' of credences in hand, we can now make sense of a notion of '*practically modulated* epistemic disvalue' (or '*practical-epistemic disvalue*' for short). Practical-epistemic disvalue always agrees with epistemic disvalue in its *ranking* of credences on the basis of their distance from the truth. So, for example, if *p* is true, it will always be better, in terms of practical-epistemic value, to have a credence of 0.9 in *p* than to have a mere credence of 0.5 in *p*. However, *how much* better (in terms of practical-epistemic value) it is, when *p* is true, to have a credence of 0.9 in *p* than to have a credence of 0.5 in *p* may depend on what is at *stake* in the relevant *practical situation*. In effect, what is at stake in the practical situation may determine *which* increasing function of the distance between the credence and the actual truth-value is the appropriate measure of practical-epistemic disvalue in that situation.

So, for example, there may be some situations in which, if *p* is true, the degree to which having a practical credence of 0.9 in *p* is better (in terms of practical-epistemic value) than merely having a practical credence of 0.5 in *p* is unusually great – whereas if *p* is false, the degree to which having a practical credence of 0.9 in *p* is worse than having a credence of 0.5 in *p* is relatively small. Intuitively, these are the situations in which the appropriate measure of practical-epistemic value favours having more adventurous or extreme practical credences.

More precisely, we may now propose the following account of which practical credences a rational agent will have. According to this account, a rational agent's practical credences will always be a probabilistically coherent set of credences that *minimizes expected practical-epistemic disvalue*, according to the measure of practical-epistemic value that is appropriate for particular choice situation at hand – where the relevant 'expectation' is defined in terms of the agent's *theoretical* credences.

[16] In the terminology of Joyce (2009), the appropriate measure of epistemic disvalue should meet the conditions of truth-directedness, normality and extensionality.

[17] It would be a challenging matter to extend this notion of the 'epistemic disvalue' of sets of credences so that it can compare sets of credences in *different* sets of propositions; I cannot address this issue here.

This approach can explain why the rational believer will never have a practical credence of 1 in a proposition in which her theoretical credence is 0.5 or less, if it is true that in *all* practical situations, the appropriate measure of practical-epistemic disvalue is a *convex* increasing function of the distance between one's credence and the actual truth-value.[18] Then the agent will never minimize expected practical-epistemic disvalue by having a practical credence of 1 in a proposition in which her theoretical credence is less than or equal to 0.5.

One famous measure of a credence's disvalue is the *Brier score* – that is, the *square* of the distance between one's credence in the proposition and the proposition's actual truth-value. The Brier score has several well-known properties, which guarantee that in any situation in which the Brier score is an appropriate measure of practical-epistemic disvalue, the practical credences that minimize expected disvalue will be those that are *identical* to the agent's theoretical credences.[19]

However, there may be other practical situations in which the appropriate measure of practical-epistemic disvalue differs from the Brier score. For example, in some practical situations, the appropriate measure might be the *cube* of the distance between one's credence in the proposition and the proposition's actual truth-value. With this 'cubic' measure, the practical credences that minimize expected practical-epistemic disvalue will be *more cautious* and *non-committal* (that is, more clustered around intermediate credences like 0.5) than one's theoretical credences. So in any practical situation in which the appropriate measure of practical-epistemic disvalue is this 'cubic' measure, a rational agent's practical credences will be more cautious and non-committal in this way.

In some other practical situations, the appropriate measure of practical-epistemic disvalue might be the distance between the credence and the actual truth-value raised to the power of some real number n such that $1 < n < 2$ – for example, the appropriate measure might be the distance between the credence and the actual truth-value raised to the power of 1.1. With this sort of measure, the practical credences that minimize expected practical-epistemic disvalue will be *more extreme* and *adventurous* (that is, closer to the extremes of 0 and 1) than one's theoretical credences.

According to the arguments of Section 6, most practical situations will in fact be situations of this latter kind, in which the appropriate measure of practical-epistemic disvalue is one of these more 'adventurous' measures. It is not clear that there are any situations in which the appropriate measure of practical-epistemic value is one of the 'cautious' or 'non-committal' measures that I have just described. Still, perhaps we should allow for the possibility-in-principle of situations of this sort. At all events, I propose the following two theses: first, there is an

[18] For a discussion of the significance of convexity, see Joyce (2009, 280–284).
[19] For a discussion of the properties of the Brier score, see Joyce (2009, 290–293).

appropriate measure of practical-epistemic value for each practical situation that an agent is in; and second, a rational agent's practical credences will always be a probabilistically coherent set of credences that minimizes expected practical-epistemic disvalue, according to the measure of practical-epistemic value that is appropriate to the particular practical situation at hand – where the relevant 'expectation' is defined in terms of the agent's theoretical credences.

8. Conclusion: Pragmatism vs. intellectualism

I shall conclude by noting the way in which this approach allows for a kind of reconciliation of the rival pragmatist and intellectualist approaches in epistemology.[20]

First, according to this approach, a form of intellectualism is true of the theoretical credences. Which theoretical credences a rational believer will have is sensitive only to the degree of justification that she has in favour of the relevant propositions – that is, as most philosophers would put it, to the degree to which these propositions are supported by the believer's evidence.

Second, a kind of pragmatism is true of the practical credences: which practical credences the rational agent will have *is* sensitive to practical considerations – such as the needs, costs and benefits that are at stake in the agent's particular practical situation – since as I have explained, these practical considerations may make a difference to the measure of practical-epistemic value that is appropriate in that situation.

Finally, a *qualified* pragmatism is true of outright beliefs: which propositions the rational believer has an outright belief in is determined by the needs, costs and benefits that are at stake in *normal* situations – though not necessarily to the needs, costs and benefits at stake in the particular situation at hand.

This account of belief is undeniably complex and elaborate. However, I hope that the arguments given here have made it plausible that belief is itself a complex phenomenon, so that no less elaborate account could do justice to this phenomenon itself.*

[20] For an illuminating discussion of the debate between pragmatism and intellectualism, see Weatherson (2005).

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