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**Epistemology, Pettigrew Style:
Critical Notice of Accuracy and the Laws of Credence,
by Richard Pettigrew¹**

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The sharpest corner of the cutting edge of recent epistemology is to be found in Richard Pettigrew's Accuracy and the Laws of Credence. In this fine book Pettigrew argues that a certain kind of accuracy-based value monism entails that rational credence manifests a host of features emphasized by anti-externalists in epistemology. Specifically, he demonstrates how a particular version of accuracy-based value monism—to be discussed at length below—when placed with some not-implausible views about how epistemic value and rationality relate to one another, ensures that rational credence manifests many of the structural properties emphasized by those who give evidence pride of place in the theory of rationality. A major goal of Pettigrew's book, then, is to make clear how accuracy-based value monism fits together with the phenomena used by those who argue against accuracy-based externalism.²

Part I of the book explains how accuracy-based value monism underwrites the view that rational credence manifests the structure of a classic probability function. Part II uses value monism to argue that something like Lewis' Principal Principle is true, and thus roughly that credence in outcome should match credence for its objective chance.³ Part III argues by appeal to accuracy-based value monism that something

¹The title of this paper is stolen from Fodor [1984]. The crime is my tribute to the paper's much-missed author. For comments on the work I'd like to thank Dave Chalmers, Dorothy Edgington, Nick Jones, Jim Joyce, Graham Oddie, Mim Schoenfield, Susanna Siegel, Maja Spener, Ralph Wedgwood, Jonathan Weisberg, and referees for MIND. For writing such a wonderful book, and talking with me so much about it, I'd like to thank Richard Pettigrew.

² For relevant discussion see Fitelson (2012), Joyce (1998) or (2009), or Sturgeon (2019).

³ I particularly recommend this bit of Pettigrew (2016), which contains a wonderful discussion of the Principal Principle, including Ishmael's important perspective in her (2008), Hall's influential New Principle in his (1994), and the puzzling phenomenon of Humean undermining. For related discussion see Lewis (1980), (1994), and Sturgeon (1998).

like the Principle of Indifference is true, and thus roughly that rational credence should spread evenly across elements of a partition for which evidence is indifferent. And Part IV argues by appeal to value monism that agents should plan to update by Conditionalization, and thus roughly that agents should plan to change credence after receipt of some news in line with their take on the world conditional on that news.⁴

Taken individually the effect of Pettigrew's arguments is routinely powerful. But taken together, and explicated beautifully side-by-side as Pettigrew does, the effect is doubly so. The net result is an extraordinarily powerful case for the view that a small number of crafted assumptions about the ground of epistemic value, together with plausible views about how that value links to ideal rationality, jointly ensure that rationality manifests the main structural features emphasized by evidentialists in epistemology.

This is a major achievement. It is my view, in fact, that Accuracy and the Laws of Credence is the current highpoint of formal epistemology, and one of the highpoints of epistemology as such.

In this note my goals are threefold. First I aim to clarify the deepest philosophical commitments of Pettigrew's book. I also hope to make the basic argumentative thrust of its position accessible to informal epistemologists. And then I hope to explain, on the basis of that discussion, why the foundations of accuracy-based epistemology should be reconceived by appeal to some ideas found in James's approach to rationality.

To begin, there are four major moving parts in Accuracy and the Laws of Credence. There are claims about what it is to be rational which are popular both inside and outside of accuracy-based epistemology. There are claims about what it is to be rational which are proprietary to the book's approach to the area. There are claims about how to represent everything mathematically. And there are theorems of mathematics. The basic idea is to start with plausible views about how the rational mind works, represent them in

⁴ I also want to flag the quality of Pettigrew's discussion of the view that there are no genuine kinematic norms, only norms for planning how to react to input. It is really terrific. See Sturgeon (2019) for related discussion.

mathematical notation, and then use mathematics to show interesting new things about rationality.

The popular claims found in Pettigrew's book are very popular indeed. One is the view that agents lend credence to propositions. Another is the view that resulting credal states are epistemically rational or irrational. There's also the view that an agent's overall collection of credal states—which we'll call her credal profile—is rational or irrational too. And that's it. Each of these claims is widely endorsed in epistemology, of course, and none is accuracy-theoretic, so we'll take them as read in what follows. We'll think of them as common ground between accuracy-based epistemologists and their opponents.⁵

Accuracy and the Laws of Credence then puts forward three further claims distinctive of its approach to epistemic rationality. Each of them is familiar from the application of utility theory to matters epistemic.⁶ We'll gloss the claims first and then spell-out their specifics:

- Veritism is the view that the seed of epistemic value is accuracy.
- No-Accuracy-Dominance is the view that whenever a credal profile is rational, it is not *a priori* that another is perforce more accurate.
- Accuracy-by-Distance is the view that the accuracy of a credal profile is given by distance between it and an ideal credal profile.

When a credal profile is rational, of course, this is an epistemic good thing about it, something which reflects epistemic value. In epistemology though, as in other areas of axiology, it is assumed that epistemic value is not fundamental. Whenever such value is possessed by a credal profile, for this reason, the assumption is that something else about the profile makes it the case that it does so. If a credal profile is rational, in other words, the assumption is that its rationality is had by virtue of manifesting some

⁵ See Sturgeon (2019) for a critical discussion of these claims.

⁶ See Greaves (2013), Joyce (1998), (2009), or Oddie (1997) for related discussion.

sort of value-investing features. Veritism is the view that exactly one feature is fundamentally capable of investing epistemic value: accuracy.

This claim is compatible with non-accuracy aspects of a credal profile generating epistemic value. But Veritism insists in such a case that the non-accuracy value-makers only derivatively play this role. The doctrine insists that they trace their capacity to generate epistemic value back to some link they have with accuracy. As Pettigrew says:

"[accuracy is] the only fundamental epistemic virtue: all other epistemic virtues derive their goodness from their ability to promote accuracy...Goldman has defended an analogous thesis with respect to full beliefs...I will follow his lead." [p.8]

This is a recognizable form of alethic-based externalism about epistemic value and rationality. It's a view aimed at credence much like Reliabilism in the theory of rational belief.

Unlike Reliabilism, though, Accuracy and the Laws of Credence does not mean to concern itself with everyday rationality, the sort of rationality had by ordinary folk in ordinary circumstances. The book is not even interested in the sort of rationality had by clever people in extraordinary circumstances. Like most work in formal epistemology Pettigrew's book is concerned with ideal rationality, the sort better than which cannot be had rationality-wise. Of course no human enjoys this sort of rationality, and, arguably, none ever can.

With this target in mind, though, No-Accuracy-Dominance is plausible. When a credal profile is ideally rational, when its rationality quite literally cannot be bettered, there should be no manifest value dominance of the profile in question. There should be no other profile which is clearly better than the ideally rational one no matter how the world works out. Veritism joins with this natural link between value and ideal rationality to yield No-Accuracy-Dominance: when a credal profile is ideally rational, no other profile manifestly out-performs it accuracy-wise in every possible world.

If the accuracy-based program is to be fleshed-out properly, though, its defenders must spell out the way in which their notion of accuracy works. This is because it is clear from the get-go that accuracy doesn't work for credence in exactly the same way that it does for belief. When an agent believes P , after all, her psychological state of belief is accurate precisely when its content is true. This is one reason why it is so natural to describe psychological states of belief as true or false. They seem to auto-inherit an alethic status from their content.⁷ But it is widely recognized in accuracy-based epistemology that accuracy for credence does not work this way.

When P is true, everyone in accuracy-based epistemology agrees that 80% credence for P is more accurate than 50% credence for P ; and when P is false, everyone in the area agrees that the accuracy facts are reversed. Yet 80% credence for P and 50% credence for P share a content, the proposition P , so variation in their accuracy is not variation in something auto-inherited from content. This is why accuracy-based epistemology accepts that accuracy does not work for credence in exactly the way that it works for belief, and also why that epistemology must spell out how accuracy works for credence.

Pettigrew is keenly aware of this point. In reaction to it he puts forward a twofold proposal about accuracy for credence. This proposal is the philosophical cornerstone of his book, so we'll pay close attention to its details.

First Pettigrew identifies, for any world w , what he says is the ideal credal profile for w . Then he pins down the accuracy of any profile at w by reference to the distance between that profile and w 's ideal profile. Together the two hypotheses amount to the Accuracy-by-Distance proposal: for any world w ,

$$A[\underline{cp}, w] = D[\underline{cp}, \underline{ipw}].$$

⁷ Another reason is the act/object ambiguity which infects all talk of belief. Sometimes that talk is meant to latch onto content of psychological states, other times it's meant to latch onto psychological states as such. It is crystal clear that the contents are accurate or otherwise, since that is how contents work. But it is not crystal clear that states of belief are themselves in the accuracy business. It is possible that intuition to that effect reflects no more than confusion brought on by the act-object ambiguity of belief-talk.

This proposal is the lynchpin of Pettigrew-style epistemology.⁸ It says that the accuracy of a credal profile at a particular possible world is given by the distance there is between that profile and the ideal profile for the world.

Summing up, then, we have five major philosophical commitments in Pettigrew-style epistemology:

- * Agents lend credence to propositions.
- * Credal profiles are subject to epistemic evaluation.
- * The fundamental seed of epistemic value is accuracy.
- * Accuracy is given by distance between credence and its ideal counterpart.
- * A credal profile is rational only if there is no other profile manifestly more accurate than it in every possible world.

Formal epistemology translates commitments like these into mathematical notation, and then it proves groovy things about epistemic phenomena by appeal to the mathematics and the induced translation. To do this for Pettigrew's fundamental commitments we'll need a math-y way to represent credal profiles as well as distance between them.

Credal profiles are represented with functions from propositions to numbers in the unit interval. Inputs to these functions are literally contents of credal states, and outputs are proxies for credal strength. When an agent is 80% sure that it rains, for instance, the credal function representing her credal profile will map the proposition that it rains to the unit-real number .8. When she is 25% sure that it rains her credal function will map the relevant proposition to the unit-real number .25. And so on. Credal functions codify credal profiles mathematically. They are perfectly standard in formal epistemology.

⁸ Pettigrew spends two terrific chapters on the measurement of accuracy. Like others he approaches the topic abstractly, posing questions about whether an accuracy measure should have this or that structural property. Eventually he argues for a strong position on which squared Euclidean distance is *the* right measure of (in)accuracy. Pettigrew is very careful, though, to note exactly where his arguments rely on this strong view and exactly where they do not.

For any set of propositions \mathbf{P} , in this framework, and any possible world w , there is a special function $\mathbf{2f}(w)$. This function takes elements of \mathbf{P} to 1 when those elements are true at w , and it takes them to 0 otherwise. We can think of this function as the janus-faced function for w , since its 1s and 0s represent

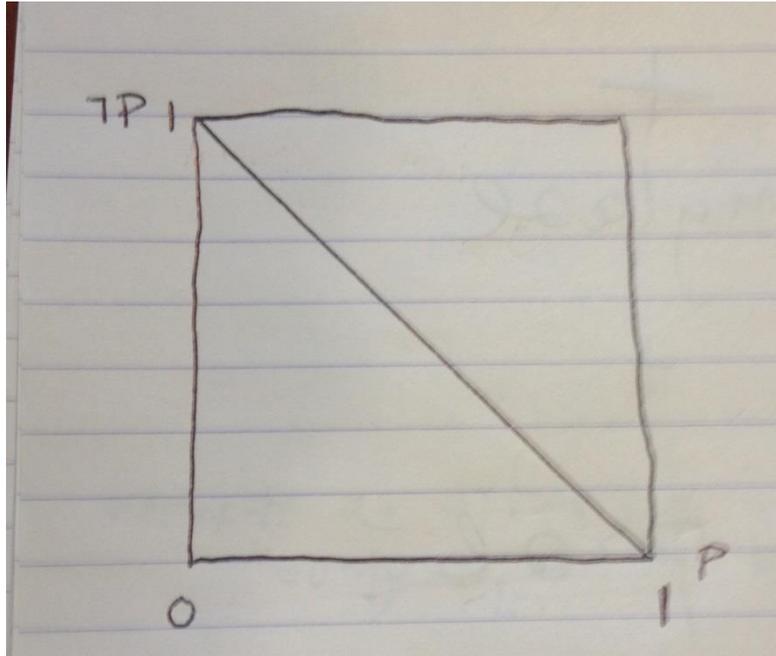
- classic truth-values at w (true/false respectively), and
- the credal profile consisting of full credence for \mathbf{P} -truths at w and no credence for \mathbf{P} -falsehoods there.

Pettigrew asserts that for any world w the ideal credal profile for w is built from full credence lent to truths at w and no credence lent to falsehoods there. His proposal is that for any world w the ideal credal function for w is its two-faced function:

$$\mathbf{ideal-cf}(w) = \mathbf{2f}(w).$$

With this all in place it is easy to see how Pettigrew's argumentative strategy proceeds in particular, and how accuracy-based epistemology does more generally.

Consider a tinker-toy case: suppose the collection of propositions \mathbf{P} we're dealing with contains only P and $\neg P$. Then we have two possible worlds in our case: one at which P is true and $\neg P$ is false, and one at which P is false and $\neg P$ is true. We can thus represent credal profiles in the case with pairs of unit-real numbers, and we can depict credal functions for \mathbf{P} with points in the unit square.



All notionally possible distributions of credence for $P/\neg P$ are represented by points in the square. And its upper-left and lower-right points represent two things at once. On the one hand they represent the credal profile which lends no/full credence to $P/\neg P$, respectively. On the other hand they represent the world at which P is false/true while $\neg P$ is true/false, respectively.

To be coherent, of course—which is to say no more than to be structured like a probability function—credence for $P/\neg P$ must “sum to unity”. This means its strength for each of the two propositions should intuitively add-up to something tantamount to absolute certainty. For this reason coherent distributions of credence in the case are represented by points on the diagonal line connecting the unit square’s representation of the P -world (in its lower-right corner) and its representation of the $\neg P$ -world (in its upper-left corner).

Further still, by Pettigrew’s lights point $\langle 0,1 \rangle$ represents the ideal credal profile for the $\neg P$ -world, and point $\langle 1,0 \rangle$ represents the ideal credal profile for the P -world. In other words,

$$\langle 0,1 \rangle = \underline{\text{ideal-cf}}(W_{\neg P}) = \underline{2f}(W_{\neg P})$$

and

$$\langle 1, 0 \rangle = \underline{\text{ideal-cf}}(w_P) = \underline{2f}(w_P).$$

So the unit square generates a crisp and intuitive description of the basic argumentative line found in Pettigrew-style epistemology. And the key to it is found in the idea that distance in the square between any of its points and one of the potential ideal points represents accuracy for the credal profile represented by the original point when the potential ideal turns out to represent the truth.

To see how this works, recall that coherent points in the unit interval are all on the marked diagonal. Let $\Sigma D(\mathbf{p})$ be the sum of the physical distance from an arbitrary point \mathbf{p} in the unit square to each of its potentially ideal points. Then for any incoherent point in the unit square \mathbf{x} —and thus for any (representation of) incoherent credal profile in the tinker-toy case we’re dealing with—there will be a coherent point \mathbf{c} in the square—and thus a (representation of) a coherent credal profile in the case—such that

$$\Sigma D(\mathbf{c}) < \Sigma D(\mathbf{x}).$$

This follows from the Pythagorean theorem, of course, but it is also intuitively obvious from the diagram.

Now recall that physical distance in the square between an arbitrary point \mathbf{p} and a potentially ideal point \mathbf{i} marks the accuracy of the credal profile represented by \mathbf{p} when the truth turns out to be represented by \mathbf{i} . Note also that greater distance between such points marks greater inaccuracy of the credal profile represented by \mathbf{p} since, intuitively, increase in that distance marks a “move away from the truth”.

Pythagorean reasoning is thus taken to show that coherent points in the unit square are manifestly guaranteed to out-perform incoherent ones accuracy-wise no matter which world turns out to be true. So it looks possible to show *apriori*—or at least possible to show relative to certain not-crazy-looking philosophical commitments and a bit of mathematics—that coherent credal profiles are perforce more accurate than incoherent ones. If that’s right, though, No-Accuracy-Dominance entails that only coherent credal profiles are rational, that rationality requires probabilistic coherence.

This line of thought exhibits the basic moves found in accuracy-based epistemology. Work in the area thus presents itself as reliant on the notion of credal accuracy—with the impression being so strong, in fact, that one could be forgiven for thinking that Pettigrew-style epistemology is essentially reliant on the notion of credal accuracy. But I want to argue that that is not really so. Indeed I want to show that the whole area can be revamped in such a way that credal accuracy is left out of the picture entirely, and once that is done the real gold in the underlying epistemology makes much better sense.

To begin, consider the everyday notion of accuracy. Notice the notion applies to all sorts of things: thoughts, maps, quarterbacks, conjectures, Mike Tyson's upper-cut, and more. All of them are evaluable for accuracy in the quotidian sense, i.e. all may be sensibly assessed as accurate or inaccurate. But notice that not everything is so evaluable: Dallas, dirt, and do-dos are not in the accuracy business, at least as those things are ordinarily conceived. So the ordinary notion of accuracy makes for a non-trivial cut in world: a large and heterogeneous group of things is evaluable for accuracy or inaccuracy, a large and heterogeneous group of things is not so evaluable.

What makes for this cut is simple to state but difficult to explicate.⁹ To a rough first approximation, everything in the accuracy business has a **target** of some kind, and everything in that business has its accuracy fixed, somehow, by the manner in which (or the degree to which) it **hits** its target

There are two ways this can work out.

On the one hand there is such a thing as content-based accuracy, which occurs when an item in the accuracy business hits its target by having a content that captures that target descriptively or otherwise (or at least comes close). This sort of accuracy occurs when an accuracy-theoretic item "lassos" its target with a content possessed by the item in

⁹ There is a high-quality literature on this topic and its lessons are directly relevant to accuracy-based epistemology. For classic theory of content see Cummins (1996), Fodor (1984) or (1987), or Milikan (1984). For excellent recent discussion see Orlandi (2004) or Ramsey (2009). For discussion of how this literature relates to accuracy-based epistemology see Sturgeon (2019).

the accuracy business: precisely what we find with maps, portraits, conjectures, utterances, and other such accuracy-theoretic items.

On the other hand there is such a thing as rifle-like accuracy, which occurs when an item in the accuracy business hits its target in a more literal sense (or comes relatively close). This sort of accuracy occurs when an accuracy-theoretic item lands some distance from its target in a proprietary sense of "land" and a proprietary sense of "distance": precisely what we find with bullets, strikes in football, passes in basketball, Mike Tyson's uppercut, and other such accuracy-theoretic items.

We should ask: which sort of accuracy is used in accuracy-based epistemology? Does it make use of content-based accuracy, rifle-like accuracy, or some newfangled type of accuracy unknown to everyday life?

One thing is clear. Accuracy-based epistemology does not use content-based accuracy. After all, every view in the ballpark maintains that 80% credence for P is more accurate than 70% credence for P when P turns out to be true; and every such view maintains that 80% credence for P is less accurate than 70% credence for P when P turns out to be false. Both of these credal states share the content P. Both are meant to represent the world, to target the facts.¹⁰ Accuracy-based epistemology allows variation in accuracy without variation in target or content. That is not possible with content-based accuracy. When something manifests that sort of accuracy, there can be no variation in accuracy without variation in target or content. Hence accuracy-based epistemology does not use content-based accuracy.

For this and other reasons Pettigrew uses rifle-like accuracy in his book. We've seen that the key idea in the approach is a lynchpin equation:

$$A[\underline{cf}, w] = D[\underline{cf}, \underline{2f}(w)].$$

This equation maintains that accuracy of a credence function at world w is given by distance between that function and the ideal credence function for w . On the approach: cf is the

¹⁰ See pliff of Pettigrew (2016) for agreement on this point.

targeting item, the analogue of a bullet, the thing which gets to be accurate by landing some distance from its target; and $\mathbf{2f}(w)$ is the targeted item, the analogue of a bullseye, the thing which helps to pin down accuracy by having things land near it. And just as the accuracy of a rifle shot is given by distance between bullet and targeted bullseye, so, on Pettigrew's view, the accuracy of a credal function at world w is given by distance between that function and ideal credal function for w .

It's important to realize, though, that the accuracy of a credence function on any such approach is not merely given by distance between it and the ideal function for a world. Instead that accuracy is reduced to distance between a credence function and the ideal one for a world. The framework denies that accuracy is explanatorily prior to distance between actual and ideal credence, and likewise denies that accuracy is explanatorily on a par with distance between actual and ideal credence. When rifle-like accuracy is used, the approach maintains that accuracy for credence is nothing over and above the interaction of more fundamental phenomena, namely:

- the ideal credence function
- distance between credence functions.

In a nutshell, the lynchpin equation is meant to be read reductively from left to right. The accuracy of credence function \mathbf{cf} at world w is reduced to distance between that function and the ideal credence function for w ($\mathbf{2f}(w)$).

There are two explanatory resources on the right-hand side of the lynchpin equation: one is the distance-between-functions measure \mathbf{D} , and the other is the janus-faced function $\mathbf{2f}(w)$. We should ask of each resource why it deserves to play its role in the reduction of credal accuracy. What is it about \mathbf{D} which earns it the right to measure distance that makes for accuracy when distance is so taken from a putative ideal? And what is it about $\mathbf{2f}(w)$ which earns it the right to be targeted in a rifle-like reduction of accuracy?

For me, at least, it came as a shock to realize that Pettigrew rejects this last question. For every world w he takes the ideality of $\mathbf{2f}(w)$ at w as theoretically basic. Not only does

his approach contain nothing to explain why the janus-faced function for w represents the ideal credal profile for w , it positively rules out the most natural thought about that topic in the neighbourhood, namely, that $\underline{2f}(w)$ is the ideal credence function for w because $\underline{2f}(w)$ is the most accurate credence function at w . Since rifle-like accuracy is being used in the approach, and the ideal nature of $\underline{2f}(w)$ is used as the target in that sort of reduction of accuracy, the ideal nature of $\underline{2f}(w)$ itself—the fact that $\underline{2f}(w)$ is the function being targeted—cannot itself be explained by appeal to the accuracy of $\underline{2f}(w)$ at w . Such a putative explanation would be viciously circular.

This seems to conflict with Veritism. After all, Veritism is the view that accuracy is the full basic seed of epistemic value. But if that is right then accuracy is the ultimate ground of such value no matter where that value is found. Yet the claim that $\underline{2f}(w)$ is ideal at w looks like the claim that $\underline{2f}(w)$ has maximal epistemic value at w . One could be forgiven, then, for thinking that the ideal nature of $\underline{2f}(w)$ at w should be explained by appeal to its accuracy. It certainly looks like it should be explained by something. But any approach which uses rifle-like accuracy for credence must reject the view that target credence is epistemically best because it is maximally accurate. For this reason, any such approach looks to conflict with Veritism; for the use of rifle-like accuracy itself requires that top-dog epistemic status of target credence is not itself grounded in the accuracy of that credence.

This spot of bother points to what's really basic in Pettigrew's approach to epistemic value. His fundamental idea does not really turn on the accuracy of credence as such, but rather the value of credence being lent to truth and the disvalue of credence being lent to falsity. It is a Jamesian foundation at the heart of his approach to epistemic value and rationality.

One way to see this is by focusing on the other resource found on the right-hand side of the reductive lynchpin equation, namely, the measure of distance between credence functions **D**. Ask yourself this: how does the measure do its work? In particular, does it calculate distance between credence functions by appeal to a mathematical representation of the

ground of distance between credal profiles represented by those functions, or, instead, does it calculate that distance by appeal to a mathematical representation of something extrinsic to the distance?

To get a feel for this and why it might matter suppose I line-up 101 worthless pots left-to-right, putting each pot one meter from its nearest neighbour(s). After doing so I put n pennies in a pot for every pot n . Then four things are true of the set-up:

- (i) pots manifest (monetary) value,
- (ii) maximal value is had by pot-100,
- (iii) the value of any pot is £1 minus a penny for each meter it is from pot-100.
- (iv) the value of any pot is the number of pennies it contains.

There are two measures of pot-value to hand in the case.

The *extrinsic* measure uses a representation of physical distance from pot-100 to cotton onto pot-value, but it appeals ultimately to features metaphysically irrelevant to the manifestation of pot-value by a pot. The *grounding* measure uses a representation of pennies in a pot to cotton onto pot-value, so it appeals ultimately to features which metaphysically ground the manifestation of pot-value had by a pot. When faced with the reductive equation for accuracy

$$\mathbf{A}[\underline{\mathbf{cf}}, \mathbf{w}] = \mathbf{D}[\underline{\mathbf{cf}}, \underline{\mathbf{2f}}(w)],$$

we should ask if \mathbf{D} is an extrinsic or a grounding measure of distance between credence functions. As we'll see, it matters whether \mathbf{D} appeals to features metaphysically irrelevant to distance between credal profiles rather than those which ground that distance.

Suppose \mathbf{D} is an extrinsic measure of distance between credence functions. Since it calculates distance by appeal to a representation of credal strength,¹¹ the resulting view is one on which distance between credal profiles is ungrounded by credal strength. If that's right, though, what *is* distance between credal profiles grounded in, if anything? Two

¹¹ Since \mathbf{D} is squared Euclidean distance.

options: either distance between profiles is grounded in something other than credal strength, or it is ungrounded phenomena.

In the former case, we need a view of what makes for distance between credal profiles if we are to assess the resulting epistemology. Only by appeal to such a view will we be able to tell if distance between profiles and epistemic value coincide, much less if epistemic value can be grounded in distance between credal profiles. Pettigrew offers no such story in his book. Given its thoroughness, that is strong evidence he rejects (as he should) the view that distance between credal profiles is grounded in something other than credal strength.

In the latter case, though—the one where distance between credal profiles is ungrounded—it is unclear why epistemology should care about distance from some putative ideal. It's not as if distance as such is epistemically valuable.¹² And it's not as if non-credal-strength-based distance between profiles has any pre-theoretic link to epistemic value. This option is a non-starter.

Suppose, then, that **D** is a grounding measure of distance between credal functions. Since **D** calculates distance by appeal to a representation of credal strength, the resulting perspective is one on which distance between credal profiles is itself grounded in that strength. This leads directly to the Jamesian ideas mentioned earlier. After all, **D** measures distance by counting credence lent to truth as a positive thing, credence lent to falsity as a negative thing, and then it calculates distance by combining positives and negatives in a natural tot-up way. The entire rationale for the approach is Jamesian through and through.

When **D** is a grounding measure of distance between credence functions it is not distance from a putative ideal as such which is of epistemic value. It is the net effect value-wise of credence being lent to truth and being lent to falsity. The root commitment in the approach is that strength of credence increases epistemic value when credence is pointed at truth, and decreases epistemic value when credence is pointed

¹² Or even epistemically on the table—in this sense, at least, epistemic value doesn't work like rifle-like accuracy.

at falsity. A Jamesian *motif* runs through the heart of accuracy-based epistemology.

In my view, we should see this branch of epistemology as a math-y way of arguing for claims about the structure of epistemic value and rationality by appeal to formalized links between credal strength, truth-value, and epistemic value. The revamping I recommend involves four crucial ingredients:

- (1) Jamesian claims about credal strength increasing epistemic value when credence is pointed at truth and decreasing such value when credence is pointed at falsity.
- (2) Claims about the detailed production of epistemic value: whether profile-level value adds-up from the value of punctate credal states, for instance, whether small shifts in credal strength make for large ones in epistemic value (while holding truth-value fixed), whether epistemic value shifts continuously as credal strength runs smoothly from weak to strong (again while holding truth-value fixed), and so on.
- (3) A No-Value-Dominance principle to the effect that whenever a credal profile is rational, no other profile is manifestly more valuable in every possible world;
- (4) Claims about the mathematical representation of all this.

It is important to realize that these ingredients are already at work in accuracy-based literature.

As argued above, for example, the best interpretation of its discussion of accuracy measures sees it as turning on the idea that accuracy is grounded in credal strength *à la* (1). Discussion of whether epistemic value is additive or continuous, or whether large shifts in epistemic value can occur via small perturbation of its ground, is central to literature on the formal properties of scoring rules. The No-Value-Dominance principle is underneath the idea that such rules should be proper or immodest. And the expression of

these claims mathematically is the signature move of formal epistemology.¹³

The shift from an accuracy-theoretic to a Jamesian take on the literature involves a reconceptualization of its basic moving parts. The most important aspect of that reconceptualization is the replacement of credal accuracy with Jamesian ideas about the grounding of epistemic value. One of those ideas maintains that such value is produced by credence being lent to truth. The other maintains that epistemic disvalue is produced by credence being lent to falsity. Once the ideas are fleshed-out in line with the literature, its formal results are preserved. Once they are detailed in line with Pettigrew's fine book, its *tour de force* compendium of results is too.

Nothing of philosophical significance in the area relies on the idea that credal accuracy is being tracked in the work. Everything of substance turns on the Jamesian idea that epistemic value is created by credence being lent to an item with a truth-value. In a recognisable sense, then, it is truth-value that is the basic epistemic commodity in the area. Truth is the goodness in play, falsity the badness (so to say).

What sort of position results from the recommended revamping of accuracy-based work? The result is a variety of externalism about epistemic value and rationality. After all, the recommended perspective is one on which both things are grounded (in part) in facts beyond the kin of an epistemic agent, namely, the truth-theoretic properties of contents had by their mental states. The resulting view is inconsistent with the idea that the full ground of epistemic value (and thus rationality) is directly accessible to an epistemic agent, and it is likewise inconsistent with the idea that the full ground of epistemic value (and thus rationality) is found within an agent's mental states. The Jamesian perspective recommended here is externalist through and through.

¹³ Perhaps this is not fully clear in the case of (3). But consider: the demand that a scoring rule be proper is deep down no more than the demand that epistemic value-makers render a credence function rational only if it does do not see itself as perforce sub-optimal. That ensures No-Value-Dominance is correct.

As it stands, of course, the perspective is often described by appeal to the notion of graded accuracy. But that notion turns on three other things: propositional content, character of target, strength-of-attitude. The area's technical results do not rely on understanding these things by appeal to graded accuracy, and nor do its explanatory aspirations. The whole story turns solely on how propositional content, character of attitudinal target, and strength-of-attitude jointly make for epistemic value. For this reason, accuracy-based literature is best understood by dropping graded accuracy and focusing instead on how content, target, and attitude jointly make for epistemic value.

Of course many think that a Jamesian story like this deserves to be characterized by appeal to the notion of graded accuracy. And they underwrite this idea with the popular bromide that high credence is "closer to the truth" than its low-credence counterpart when each is lent to a truth, and the equally popular bromide that high credence is "farther from the truth" than its low-credence counterpart when each is lent to a falsehood. But this rationale for use of graded accuracy rests on a mistake, one which Pettigrew is careful to avoid.¹⁴ I close by sketching what goes wrong in this popular line of thought.

When a formal model has a feature F, we should not assume that phenomena being modelled do too. Sometimes a target domain will manifest the feature in question, sometimes it will not. To see a case of the latter sort suppose that the real number .8 is an abstract object, something which exists outside of space and of time. This real number can be used to model an agent's 80% credence for P. But no one should think from all this that her 80% credence for P is itself an abstract object, something which exists outside of space and of time. That would be silly.

Take another example, one closer to home. The real number .8 is mathematically larger than the real number .7. These real numbers can be used to model an agent's 80% credence for P and

¹⁴ See p.77ff of Pettigrew (2016). See also Fitelson (2012), Sturgeon (2009) and (2019) for related discussion.

her 70% credence for Q, respectively. But this doesn't mean that the agent's 80% credence for P is mathematically larger than her 70% credence for Q. To be sure, her 80% credence for P is psychologically *stronger* than her 70% credence for Q, but this sense of strength is quite different than the mathematical notion of size involved in .8 being larger than .7. One psychological state being stronger than another is not the same thing as its being mathematically larger than the other. To think otherwise is illicitly to project a feature of a formal model onto phenomena being modelled. The only sense in which an agent's 80% credence for P is larger than her 70% credence for Q is a metaphorical sense of largeness.

The same thing is true, *mutatis mutandis*, for talk of credence being close to the truth. The real number .8 is mathematically closer to the real number 1 than is the real number .7. We can use 1 and 0 to model truth and falsity just as we can use .8 and .7 to model 80% credence for P and 70% credence for Q. But none of this means, when P and Q are each true, that 80% credence for P is mathematically closer to the truth than 70% credence for Q. To think otherwise is to commit the sin of faulty projection twice over: once in the attitude slot of a model and once in its truth-value slot. When P and Q are each true, the only sense in which 80% credence for P is closer to the truth than 70% credence for Q is a metaphorical sense of closeness. There is no literal truth in talk of closeness to the truth.

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