Comment on Roger White's "Evidential Symmetry and Mushy Credence"

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Formal Epistemology Workshop – May 1, 2008

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1 Introduction

Roger White's "Evidential Symmetry and Mushy Credence" brings up a number of interesting points in defence of the Principle of Indifference (POI). My goal in this short paper is to highlight a few of these points for added attention, to draw connections between the issues White sees with mushy credences and some technical issues in the study of vagueness, and to present a possible response to the Coin Puzzle along the lines of the supervaluationist approach to vagueness.

2 Evidence, Symmetry, and Partitions

White begins his paper with a discussion of a seemingly innocuous principle of evidential symmetry: "Propositions p and q are **evidentially symmetrical** (I'll write this as $p \approx q$) for a subject if his evidence no more supports one than the other".[1] Starting with this evidential symmetry, the Principle of Indifference just tells us to assign equal probabilities: "$p \approx q \rightarrow P(p) = P(q)$" where P is "a subject's *rational subjective probability*, or *credence* function".[2]

It is the symmetry which is the key here. White insists that we need *reasons* to favour one proposition over another and break the symmetry of evidence between them.

Evidential symmetry seems much weaker and easier to swallow than the Principle of Indifference. But White demonstrates that the multiple partitions problems that are supposed to show that POI is deeply flawed run into difficulty even with this weaker principle. In White's Mystery Square example (a variation on van Fraassen's box factory) assuming just transitivity and equivalence is enough to show the strange result that the areas $A_2 \approx (A_2 \vee A_3 \vee A_4)$, where we would expect the evidence for a disjunct to be strictly less than the evidence for the disjunction.

Once he shows that the multiple partitions problem cuts both ways, White considers three reasons why we should support the Principle of Indifference:

1. There are cases (like the Sleeping Beauty problem) where we can't rely on frequency information, but POI gives us the right answer.

2. Although some people prefer Frequency-Credence to POI, they both entail POI*: "If $\{p_1, p_2, \ldots, p_n\}$ is a partition of your knowledge such that $p_1 \approx p_2 \approx \cdots \approx p_n$, then for all i $P(p_i) = \frac{1}{n}$".[3]

3. The Evidentialist Argument: "One's confidence should adequately reflect one's evi-

[1] Original emphasis. White, "Evidential Symmetry and Mushy Credence", p. 1.
[2] Original emphasis. ibid., p. 2.
[3] Ibid., p. 3.

dence (or lack of it). You need a good reason to give more credence to p than to q. Hence if one's evidence is symmetrical so should be one's degrees of confidence. This is the fundamental thought behind POI and it can't be easily dismissed. What other option is there?"[4]

The remainder of the paper considers a current line of objection from "mushy credences" to the evidentialist argument.

3 The Chance Grounding Thesis

To counter the evidentialist argument one might reply that the application of the Principle of Indifference destroys the distinction between knowledge of chances about a situation and ignorance about the situation. As White phrases the reply: "Yes, evidential symmetry demands symmetry of opinion. But by failing to distinguish cases of *known chances* and cases of *ignorance*, the follower of POI *fails* to adequately represent his evidential state".[5] The alternative is the notion that credence should be "mushy" (also "indefinite", or demonstrating "vague probability", "imprecise probability", "thick confidence") in order to model our ignorance.

The core of the reply to the evidentialist argument for POI, as White expresses it, is the Chance Grounding Thesis: "Only on the basis of known chances can one legitimately have sharp credences. Otherwise one's spread of credence should cover the range of possible chance hypotheses left open by your evidence".[6] The Coin Puzzle is specially crafted to show how the Chance Grounding Thesis leads to all sorts of trouble. The key to the Coin Puzzle is the connection between a mushy credence about a proposition p and a sharp credence about the toss of a fair coin. When the two are tied together something has to give: do we want mushy credence about the coin toss, or sharp credence about p? Both answers cause

[4]Original emphasis. White, "Evidential Symmetry and Mushy Credence", p. 10.
[5]Ibid., p. 11.
[6]Ibid., p. 12.

problems for a mushy credence account.

White provides four objections to the view that credence in *heads* should dilate to [0,1] after the coin toss:

1. You know that the coin is fair, and you haven't lost any information about it.

2. It's (usually) rational to match your present credence with your future credence. If you know that your credence will be dilated after the toss, it should be dilated before the toss.

3. There are two options for applying mushy credences to betting: liberal and conservative. The liberal option leads to taking bad bets. Symmetrically, the conservative option prevents you from taking good bets.

4. Consider the case of a million coins. You should be as sure as you are of anything that approximately half of them will come up *heads*.

White does not consider this list to be exhaustive, but these are reasons enough for him to doubt the mushy credence line of reply to the evidentialist argument for the Principle of Indifference.

4 Objection 5: Higher-Order Mushiness

In the remainder of this short paper I will consider a fifth line of objection to the Chance Grounding Hypothesis. This objection runs parallel to a problem in the study of vagueness, and by considering that issue and one standard response I will construct a possible reply to White's Coin Puzzle.

The fifth objection to the Chance Grounding Thesis starts by asking about higher order credences. If we have a mushy credence about p, spread over the range [0.4,0.6] for example, how do we justify setting the boundaries of our ignorance precisely at 0.4 and 0.6? The only justification for doing so on the basis of the Chance Grounding Thesis would be known

chances, and how could we get known chances defining our ignorance about p out of our ignorance about p?

The only option seems to be to make the borders of one's credences fuzzy. However this just pushes the problem up one level, and the same objection can be made again: why have sharp boundaries for your second-order ignorance?

5 Vagueness and Responses

This objection to mushy credences connects to a series of problems coming out of the vagueness literature. By taking a moment to discuss these issues in the study of vagueness, I believe that I can formulate a potential reply to the Coin Puzzle.

Vagueness applies to terms like "tall" and "bald", where it's not clear where to draw the line between a tree that's tall and one that's not tall, or a man who's bald and a man who's not bald. The classic sorites paradox presents the problem starkly: if we have a single grain of sand, to which we add another, and another, and another, when does the collection of grains become a heap? Likewise, if we start with a heap of sand and remove one grain at a time, when does the heap stop being a heap?

There are four main lines of response to the sorites paradox:

1. Some of the premises are false. There is a fact of the matter about how many grains make a heap, even if we don't know it.

2. The argument is invalid. Heaps come in degrees, and we need a multi-valued logic to model them.

3. The argument is sound. There are no heaps.

4. Logic doesn't apply to our vague language.

The first approach is called the "epistemic approach", and it has the virtue of maintaining the law of the excluded middle and the rest of classical logic. The second response appeals to

a more sophisticated formalism, either with a finite number of truth values or a continuous range, which is not compatible with classical logic. The third and fourth replies just bite one bullet or another.

I believe that the epistemic approach is the most similar to the Chance Grounding Thesis. On this view we should handle problem cases of heaps and problem cases of credences similarly: by abstaining from making an assertion one way or the other. Because of our ignorance we are unsure whether a collection with more than n grains of sand but fewer than m grains of sand is a heap, and so we should not say anything about a pile which has a size in the range $[n, m]$. Likewise, we should only say that we know the probability of p is more than 0.4 and less than 0.6, so we can only have a credence spread over the range [0.4,0.6].

The objection from higher-order vagueness is this: If you are ignorant about whether a collection of size $[n, m]$ is a heap, how are you so sure that n and m mark the precise boundaries? One reply is to set new vague boundaries around n and m, such as $[n-i, n+j]$ and $[m-k, m+l]$. But this reply falls victim to a second application of the objection, asking why these precise second-order boundaries should be so sharp.

But there is a variation on the epistemic approach which some prefer, and which may also be of some use in the case of mushy credences.

6 Supervaluationist Mushy Credences

Supervaluation is an approach to vagueness related to the epistemic approach but with additional sophistication. Keefe traces the history back to van Fraassen (1966, 1967, 1969) and Mehlberg (1958), with the standard statement of the view by Fine (1975).[7]

The key idea is that there are clear cases of "tall", clear cases of the negation of "tall", and cases in between. For those middle cases there is a range of methods by which they can be made precise (eliminating all indeterminacy). By evaluating in the meta-language over

[7] Keefe, *Theories of Vagueness*, pp. 165-166.

the range of these *precisifications* we arrive at the super-valuation. Cases which are true on all precisifications are super-true, and for a supervaluationist truth is super-truth. Note that the precisifications don't have to be the application of any particular rule – they can be drawn by fiat.

On a similar model, there are many different ways in which I could sharpen my credences. On any given precisification of my credence in p, the Coin Problem is not a problem. When forced, I will sharpen my credences, perhaps by applying the Principle of Indifference, but I can maintain the distinction between known chances and my ignorance of the situation.

I think that this approach avoids the four lines of objection White raises:

1. Any particular case can be solved by some precisification.

2. My credence will stand up to future reflection.

3. I can make good bets.

4. I can make statement about by credence in the million-coin case.

Perhaps the least satisfying response is to my new fifth line of objection. Supervaluationism deals with higher-order vagueness (on Keefe's account) by drawing on a vague metalanguage. The vagueness of the metalanguage would have to be spelled out in the meta-metalanguage, but at least the means by which it is spelled out would be consistent. So on this account there's mushy credence all the way up.

Prima facie, I think that these five objections can be handled by supervaluationist mushy credences, although I stand to be corrected. However, there are two independent reasons why I am less than satisfied with the supervaluationist approach to mushy credences.

First, while in the case of vagueness there seems to be any number of different equally good precisifications, in cases of credence it seems that applying POI or POI* is almost always the right approach. As White points out, any other approach, like dividing them .327 : .673, just seems ad hoc.

Second, with this first objection in mind, why are we bothering to distinguish sharp and mushy credences? As White mentions: "If the answer is that one should bet *as if* one has sharp credence we might wonder once again what the difference between sharp and mushy credence really consists in".[8]

7 Conclusion

Roger White's "Evidential Symmetry and Mushy Credence" gives us good reasons to rethink the common rejection of the Principle of Indifference. He points out that the standard partition problems like the Mystery Square are also problems for much weaker claims about evidential symmetry than POI, so perhaps we shouldn't worry so much about them. And the current approaches using mushy credences don't seem to be able to handle White's Coin Puzzle.

In this short paper my goal was to add one more objection to White's collection, based on higher-order mushiness. In the study of vagueness, supervaluationism is used to escape that problem (among others), and it seems to me that a supervaluation approach to mushy credences might allow one to wiggle out of the Coin Puzzle.

However, at the end of the day, the supervaluationist approach to mushy credences seems to lack motivation. As White suggests at the end of his paper, perhaps "we owe Laplace an apology for deriding his principle".[9]

[8] Footnote 11. White, "Evidential Symmetry and Mushy Credence", p. 20.
[9] Ibid., p. 22.

References

Keefe, Rosanna. *Theories of Vagueness*. Cambridge: Cambridge University Press, 2000.

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