Confidence and Coarse-Grained Attitudes*

Scott Sturgeon
Wadham College, Oxford

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It is a datum that we believe, disbelieve and suspend judgement. It is also a datum that we invest levels of confidence. How do these activities relate to one another? More specifically: how do the psychological states of belief, disbelief and suspended judgement relate to the psychological states of invested confidence? and how do the related epistemologies of these states relate to one another?

This paper will set out answers to these questions. My goal will be to make clear why something like the picture to be developed must be right, and to use that story to explain why the orthodox model of that picture goes wrong. In §1 I present a familiar line on the relation between confidence and more coarsely grained attitudes. In §2 I make trouble for that line by motivating a liberalisation of its conception of confidence. In §3 I detail a link that the liberated conception of confidence bears to belief, disbelief and suspended judgement. And in §4 I use that story to explain why the orthodox model of the liberated conception of confidence goes wrong.

1. A Credal Approach to Coarse Attitudes.

Belief, disbelief and suspended judgment are epistemically evaluable attitudes. Together they make for a coarse-grained set of such attitudes, a set members of which are used with little-to-no difficulty by the folk. Belief, disbelief and suspended judgement are readily used in the everyday prediction and explanation of one another; and that is why belief, disbelief and suspended judgment form into a pillar of daily practice.

Similarly, levels of confidence are epistemically evaluable attitudes. Together they make for a fine-grained set of such attitudes, a set members of which are likewise used with little-to-no difficulty by the folk. Levels of confidence are readily used in the everyday prediction and explanation of one another; and that is why levels of confidence also form into a pillar of daily practice. It through levels of confidence, after all, that subtle differences are regularly exploited in the prediction and explanation of otherwise like-minded folk.

Our framing questions concern coarse- and fine-grained attitudes. Specifically: how are they metaphysically related to one another? and how do their respective epistemologies relate to one another?

A natural approach to these questions springs from a combination of two thoughts. The first is that levels of confidence are well modelled by real-valued probability functions. This is taken to be an idealisation, of course; but the key empirical commitment is that such modelling works well to at least several decimal places. Real-valued degree of belief—or "credence" as it is known—is said to track and explain shades of behaviour in line with our everyday efforts to do so by appeal to

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confidence. The modelling of confidence with real-valued credence functions is thus said to be a standard case of idealisation: length and height can be well modelled with real numbers even if everyday objects are not nearly so precise in themselves; and likewise levels of confidence can be well modelled with real-valued credence functions even if those very levels are not nearly so precise in themselves. I accept that in what follows.[1]

The second idea is that belief, disbelief and suspended judgement grow from real-valued credence. The relation between them can be pictured this way:

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                 Φ
               ----------------------------------------100%
       Belief  😐/☺
               ----------------------------------Belief-making Threshold
   Suspended
   Judgement    ☹☹
               ---------------------------Disbelief-making Anti-threshold
    Disbelief  😐/☺
               -------------------------------------------0%
```

Figure 1

On this view belief is identical to sufficiently strong credence, disbelief is identical to sufficiently weak credence, and suspension of judgement is identical to credence neither sufficiently strong to make for belief nor sufficiently weak to make for disbelief. On this view belief, disbelief and suspended judgment are nothing but credence in the rough.[2]

In the event, epistemic norms for coarse attitudes will spring from probabilistic norms for credence. After all: belief, disbelief and suspended judgement stand to credence as red and blue stand to crimson and azure. Belief, disbelief and suspended judgement stand to credence—on the picture in Figure 1—as determinables stand to determinates. There is nothing to belief, disbelief and suspended judgement other than credence, so reasonable production and arrangement of coarse attitudes derives from reasonable production and arrangement of credence. The epistemology of coarse attitudes flows directly from a credal approach to epistemology known as "Probabilism".

Now, the careful reader will have noticed that there are happy, neutral and unhappy faces in Figure 1. The former indicate that there is something deeply right in the threshold approach to belief and disbelief.[3] The latter indicate that the threshold approach to suspended judgement is utterly wrong. And neutral faces indicate that the credal base of the threshold approach is not quite right as it stands. My view is that there is something deeply right and something deeply wrong with the threshold model as depicted in Figure 1. To sketch why, though, I shall need to liberalise the notion of confidence in play. Once that is done, it will turn out that suspended judgement—

[1] See Cook [2002] for a defence of the perspective endorsed here.

[2] To augment a phrase of Mark Kaplan's. He has long argued forcefully against a threshold approach to coarse attitudes. I am more sympathetic to the approach than he is, though I'll be complaining some about it here. See Kaplan [1998] and Sturgeon [2008] for further discussion.

[3] I shall mostly ignore disbelief in what follows, taking it as read that disbelief should align with belief in negation. There are several reasons to worry about this—see Field [2003] and Rumfitt [2000]—but nothing in what follows turns on the issue.

somewhat surprisingly—is the key to the metaphysics and epistemology of both coarse- and fine-grained attitudes.

2. Thick confidence.

David Lewis defends a systematic link between credence lent to claims about chance and credence lent to claims about chancy events. To a rough first approximation: his view is that whenever a rational agent is sure about the current chance of a future outcome, she should set her credence in that outcome equal to that chance. Lewis defends this basic role for claims about chance through a series of thought experiments. He implores readers to share his intuitions about those thought experiments, and he codifies the lot with a principle. Lewis claims that principle captures everything we know about chance; so he calls it the "Principal Principle".[4]

In similar vein I defend a thesis concerning the type of attitude rationally taken to a claim and the character of evidence on which it is based. I introduce my thesis through a series of thought experiments, and I implore you to share my intuitions about them. Three will be used in what follows:

<u>Case 1</u>. You are faced with a black box while rationally certain of this much: the box is filled with a huge number of balls; they have been thoroughly mixed; exactly 85% of them are red; touching a ball will not affect its colour. You reach into the box, grab a ball, and wonder about its colour. You have no view about anything else relevant to your question. How confident should you be that you hold a red ball?

You should be 85% sure, of course. Your confidence in the claim that you hold a red ball is well modelled by a position in Probabilism's "attitude space":

```
                                                  85%
|-----------------------------------------------+----------|
0%                                                         100%
```

con(R)

[Figure 2]

Here we have one attitude ruled in by evidence while others are ruled out. The case suggests a principle:

> <u>Out-by-In</u> Attitudes get ruled out by evidence because others get ruled in.

In Case 1, after all, everything but 85% credence is ruled out by your evidence precisely because that very credence is itself ruled in.

<u>Case 2</u>. The set up is just as before save this time you are rationally sure that exactly 80-to-90% of balls in the box are red. How confident should you be that you hold a red ball?

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[4] For relevant discussion see Lewis [1987] and [1994]. Lewis's claim that the Principal Principle captures all that we know about chance—made at p.86 of [1987]—does not sit well with his realism about chance; for that realism springs from a general realism about science. As a result, Lewis treats the Principal Principle is if it is an apriori bit of common-sense about an unobservable from science. This is of dubious coherence.

You should be exactly 80-to-90% sure, of course. Your confidence in the claim that you hold a red ball cannot be well modelled with a position in Probabilism's attitude space—i.e. with a credence function—for your evidence is too rough for that tool. Certain attitudes within credal space *are* ruled out by your evidence; but no attitude in that space is itself ruled in. This puts pressure on the Out-by-In principle.

I want to resist that pressure by insisting that there are more kinds of confidence than credence. This is both obvious after reflection and of first importance for epistemology.[5] For one thing, it means that Probabilism is an *in*complete epistemology of confidence, as it lacks an epistemology of what I call "thick confidence".[6] For another thing, thick confidence proves central to the role of belief, disbelief and suspended judgement within an epistemology of confidence. All this will take some explaining, of course, but telling the tale will also make clear why the so-called "dilation" of sets of probability measures is problematic for defenders of the orthodox model of thick confidence.

To begin, think back to Case 2: evidence in it demands more than a point in credal space. It demands something like an exact region instead. Evidence in Case 2 rules in a thick confidence spread from 80% to 90%:

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                                                   80%       90%
|-------------------------------------------|-----------|------|
0%                                                              100%
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con(R)

[Figure 3]

Everyday evidence is normally too coarse-grained to rule in credence. This does not mean that everyday evidence tends not to rule in confidence. It just means that such evidence tends to rule in thick confidence.

Now, talk of thick confidence is metaphorical to be sure; and so is talk of spreading confidence through a region of credal space. But sometimes a metaphor is called for, and this is one of those times. There are at least four reasons for this. In reverse order of importance:

(i) Talk of thick confidence connects humorously and mnemonically with the important fact that evidence in Case 2 is meagre, that it rationally makes for an

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[5] The need for non-credal confidence has long been recognized. Classic recent philosophical discussion of the notion can be found in Hacking's [1975],Levi's [1974] and Jeffrey's [1983]. More recent philosophical discussion of thick confidence can be found in Joyce's [2005], Kaplan's [1998] and Maher's [1993]. van Fraassen first presented his "representor" approach to thick confidence in [1985]; see also his [1987]. See also Keynes's [1921], Ramsey's [1978] and Kolmogorov's [1933]. Thick confidence is basically Ramsey's subjectivism stripped of its real-valued mathematics and the overly precise metaphysics meant to be modelled by it. For recent technical discussion of the idea see Walley's [1993] and Halpern's [2003].

[6] This is what Roger White calls "mushy credence". I have chosen—both here and in my [2008]—to avoid any label for thick confidence which uses the word "credence"; for "credence" was introduced—to the best of my knowledge—by Lewis as a technical term for point-valued subjective probability. Since the literature has followed this usage, the phrase "mushy credence" strikes my ear as a contradiction.

attitude of relative stupidity. When all you know is that 80-to-90% of balls in the box are red, after all—and you care whether the ball you have in hand is red—then you are, in a parody British sense at least, "thick" about relevant details. Your evidence warrants only thick confidence in the claim that you hold a red ball.

(ii) Talk of thick confidence captures the palpable "spread out feel" of the attitude warranted by evidence in Case 2. In some clear sense that attitude is fatter than real-valued subjective probability; and intuitively, at least, that is so because evidence involved in Case 2 is too rough for standard credence, too meagre for subjective probability. Talk of thick confidence is apt because it captures the intuitive feel of the attitude warranted by evidence of this kind.

(iii) Talk of thick confidence—i.e. confidence spread through a region of the unit interval—links directly to a formal model well known in the area. Specifically, it so links with an approach on which thick confidence is modelled by richly-membered sets of probability functions rather than a single probability function. Such an approach gives Probabilism a human face—in Jeffrey's memorable phrase[7]—precisely because it sees thick confidence through sets of probability functions rather than a single probability function. When a rational agent responds to her evidence by lending Φ exactly 80-to-90% confidence, say—when she spreads her confidence in Φ from .8 to .9 in our metaphor—the approach in question models her take on Φ with a set of probability functions containing, for every number in [.8, .9], a probability function assigning that number to Φ. This set models her thick confidence in a way that associates it with a region of the unit interval; so our talk of spreading confidence across such a region connects directly with this kind of approach to thick confidence.

(iv) On this approach sets of probability functions are used to model an agent's psychological state rather than a single probability function. Rational dynamics are then developed by applying conditionalisation to members of those sets for which it is defined. The resulting view generalises Probabilism in an obvious way. Unfortunately, the theory yields counter-intuitive results which flow from the so-called 'dilation' of sets of probability functions.[8] Some details about this will be explained in the next section. The relevant point here, though, is just that the orthodox model of thick confidence--as it stands anyway--does not work very well. Hence the literature on the phenomenon simply contains no well-functioning *non*-metaphorical model of thick confidence.

These four points make it clear that metaphorical talk of thick confidence—like that of confidence spread across regions of credal space—is both well motivated and apt for our purposes. We should be mindful that such talk *is* metaphorical, of course; but we should not let that stop us from using it to inspire our work or guide our thought. That shall be my strategy.

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[7] Jeffrey [1983].

[8] As we'll see, the dilation of a set of probability functions occurs when a thick confidence in Φ at one moment—which does *not* stretch from no confidence to full confidence—turns into a thick confidence in Φ at the next moment—which *does* stretch out in that way—simply because the agent learns something intuitively irrelevant to Φ. Edifying technical discussion of dilation can be found in Siedenfeld and Wasserman's [1993], and also Heron, Seidenfeld and Wasserman's [1997]. Philosophical discussion of dilation can be found in van Fraassen's [1990] and [2005].

Case 3. You are faced with a black box while rationally certain of this much: the box is filled with a huge number of balls; the balls have been thoroughly mixed; touching any of them will not affect its colour; and one more thing...(five versions):

(i) A slim majority of balls in the box are red.
(ii) A solid-but-not-total majority of balls in the box are red.
(iii) A very-solid-but-not-total majority of balls in the box are red.
(iv) A very-very-solid-but-not-total majority of balls in the box are red.
(v) Every ball in the box is red.

In each version of the case you reach into the box, grab a ball, and then wonder about its colour. In each version of the case you have no view about anything else relevant to your question. How confident should you be in each version of the case that you hold a red ball?

Well, it is obvious that you should be more than 50% sure in each of them. It is also obvious that your confidence should be weaker in the first version than it is in the second, weaker in the second version than it is in the third, weaker in the third version than it is in the fourth, weaker in the fourth version than it is in the fifth. And it is obvious that your confidence should be maximal in the fifth version: you should be sure that you hold a red ball then. This much is perfectly clear:

$$50\% < con_{(i)}(R) < con_{(ii)}(R) < con_{(iii)}(R) < con_{(iv)}(R) < con_{(v)}(R) = 100\%.$$

A bit more specifically: it is clear you should be mildly confident that you hold a red ball in version (i), fairly confident that you do so in version (ii), very confident but not certain that you do so in version (iii), and very, very confident but not certain that you do so in version (iv).

Those fond of sharp confidence will demand an exact level of confidence in each case. But this is a bad demand, for it presupposes that Case 3 involves evidence to warrant sharp levels of confidence. That is simply not so. Only vague levels of confidence are warranted by evidence in each version of the case. In each of them you should have fuzzy confidence that you hold a red ball, you should lend a fuzzy region of credal space to that claim.

It is of first importance to realize, however, that this is ***not*** because you are less than ideally rational with your evidence in Case 3. Rather, it is because vague regions of credal space are all that can be got from your evidence in the case. On the basis of that evidence perfect thinkers can do no better; for your evidence is vague through and through, vague to the core, inelimanably vague. Fuzzy thick confidence is all that can be got from such evidence. It rationally makes for no more.

The moral here is simple to state: the attitude taken to a claim should be fixed by the character of evidence on which it is based. I call this the "Character-Match Thesis". It states that evidence and attitude should match in character: when evidence is essentially sharp, it warrants a sharp attitude; when evidence is essentially fuzzy, it warrants a fuzzy attitude. When evidence is maximally precise it warrants credence—real-valued subjective probability. When evidence is not maximally precise—as in most of the time—some other kind of attitude is called for, some kind of thick confidence.

On the perspective I am defending, then, confidence is a many-splendored thing. It can be maximally precise as in real-valued subjective probability. It can vary from that extreme along two not fully independent dimensions. Confidence can be thicker than real-valued credence, and it can be fuzzier than real-valued credence. The space of fundamental epistemic attitudes is far richer than the standard space of credence. Probabilism is built atop a hopelessly impoverished psychological space.

3. Thick Confidence, Belief and Suspended Judgement.

The take on confidence just sketched—call it the "liberated" conception of confidence— makes ready room for coarse belief within an epistemology of confidence. It also proves central to a good understanding of suspended judgment within such an epistemology. Consider these topics in turn.

1. The liberated conception of confidence can easily locate a minimal sufficient condition for coarse belief. It need only point to thick confidence running from the belief-making threshold to certainty:

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                                          t
|-----------------------------------------+---------------|
0%                                                          100%
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con(R)

[Figure 4]

Call this the "**t**-spread" of confidence. Since propositional attitudes are individuated functionally, manifesting the **t**-spread of confidence requires exactly two things: one must manifest the functional property shared by all and only believers, and one must fail to do so by manifesting a determinate of that functional property. In this sense the **t**-spread of confidence is belief and only belief, yet distinct from belief as such.

Think of it this way: on the threshold approach one can manage the coarse-grained attitude of belief by adopting a credence of sufficient strength. Doing so is functionally incompatible with adopting the **t**-spread of confidence. Since propositional attitudes are individuated functionally, it follows that adopting a belief-making credence is incompatible with adopting the **t**-spread of confidence. On the threshold approach to belief, therefore, the **t**-spread of confidence makes for belief, stronger-than-**t** credences do so as well; yet adopting the **t**-spread of confidence is incompatible with adopting any such credence.

Or think of it this way: for any claims C_1, C_2, and so on, believing C_1 is a functional property $\mathbf{F}(C_1)$, believing C_2 is a functional property $\mathbf{F}(C_2)$, etc. **F** is a functional map which takes a claim onto the functional property manifestation of which is belief in that claim. Belief is basically **F**; and the **t**-spread of confidence is basically **F**-unrealized-in-anything-finer-in-functional-grain. Real-valued credences are hyper-fine-grained functional properties. Possessing one of sufficient strength is sufficient for **F**; but doing so is incompatible with possessing the **t**-spread of confidence, for doing so amounts to possessing **F** by possessing a credal determinate of **F**. This is why the **t**-spread of confidence is not the same thing as belief. The **t**-spread of confidence is more like the state of believing-while-doing-nothing-finer-in-functional-grain-than-believing. The **t**-spread of confidence is belief and nothing psychologically more than belief. It is a minimal sufficient condition for belief.

2. Reflection on thick confidence also permits a good understanding of suspended judgement within an epistemology of confidence. To see how, consider a thought often found in the epistemology of coarse belief:

(*) **SJ**(Φ) iff [¬**B**(Φ) & ¬**DB**(Φ)].[9]

The idea is to reduce the attitude of suspended judgement to the absence of belief and disbelief. But that is a hopeless task, for the joint absence of belief and disbelief is insufficient for suspension of judgement. And the root reason for this is that suspended judgment is a non-trivial kind of judgement, a non-trivial kind of <u>committed neutrality</u>. The joint absence of belief and disbelief is no kind of judgement at all, no kind commitment. Hence it is possible to satisfy the right-hand side of (*) without satisfying its left-hand side. It is possible to fail in belief, fail in disbelief, and yet fail in suspended judgement as well. This sort of thing happens, for instance, when one is in the midst of fixing one's take on Φ, or when one has never considered Φ, and so on. In no such case would it be true that one formed a judgement, much less a neutral judgement, about Φ.[10] Hence the right-hand side of (*) is too weak for its left-hand side. The joint absence of belief and disbelief is insufficient for suspended judgement.

A similar problem infects the threshold view of suspended judgement. To see this, consider the picture with which we began:

Φ

--100%

Belief ☹/☺

----------------------------------Threshold

Suspended Judgement ☹☹

---------------------------Anti-Threshold

Disbelief ☹/☺

---0%

Figure 1

The middle part this picture depicts a credal analogue of (*). Since Probabilism entails that ideally rational agents invest credence in all claims of interest, Probabilism sees the middle part of Figure 1 as a depiction of this idea:

(**) **SJ**(Φ) iff [¬**B**(Φ) & ¬**DB**(Φ)] iff [Anti-Thresh ≤ cr(Φ) ≤ Thresh].

The key thought is that facts about suspended judgement are nothing but facts about middling-strength credence. But that too is dead wrong, for middling-strength credence does not involve the kind of considered reserve at the heart of suspended judgment. After all, credence is a hyper-non-neutral commitment, something rather the opposite of suspended judgement. Credence is adopted when one is committed--idealisation aside--down to the very last detail about the measure of a claim's epistemic possibility. This is the opposite of committed neutrality, the opposite of suspended judgement. While I <u>do</u> think that such judgment can be well understood by appeal to confidence, I do not think it can be so understood by appeal to credence. Credence is a way of manifesting belief—as the Threshold View rightly insists—but

[9] This principle is endorsed by most theories of belief revision and defeasible reasoning. See Gärdenfors [1988] or Pollock [1995].
[10] For further discussion and defence of these claims Sturgeon [2008].

it is no way of manifesting suspending judgment. That notion is best understood by appeal to thick confidence. It cannot be well understood by appeal to credence.

Specifically, the best way to think of thick confidence is as a *located grade of suspended judgment*. The level of thickness—10% of the unit interval, 40%, or whatever—measures how strong the suspension of judgement turns out to be. The positioning of its boundaries—running from .25 to .35, for instance, or being vague in a certain way—locates the position and character of a given level of suspended judgement. On this way of looking at things, one can start with credence or suspended judgement and work to a sound conception of the other notion. If one begins with the idea that suspended judgment can diminish in degrees, one can work to a good understanding of credence by noting that those degrees might go to nil. If one begins with the idea that credence can be thickened to various degrees, one can work to a good understanding of (fully) suspended judgement by noting that those degrees might go to 100%. Either way thick confidence is seen as a located grade of suspended judgment. Credence and suspended judgment are seen as opposing sides of one coin. As we'll see in a moment, this conception of thick confidence helps clarify why the orthodox formal model of thick confidence fails. Exploring that topic is our next task.

4. Thick confidence and sets of credence functions.

Orthodoxy about thick confidence is a generalisation of Probabilism. The latter view, recall, models credence with a single probability function; and it models the update of credence with conditionalisation. A natural thought is to model thick confidence by generalising the perspective. The idea would be to use sets of probability functions to model thick confidence, and then to apply conditionalisation to the members of those sets—for which it's defined—in order to model the update of thick confidence. This is the orthodox approach to thick confidence in what follows.[11]

The perspective is challenged by a thought-experiment due to Roger White. Here is his description of the case:

> You haven't a clue as to whether *p*. But you know that I know whether *p*. I agree to write 'p' on one side of a fair coin, and '¬p' on the other, *with whichever one is true going on the Heads side*. I also paint over the coin so we can't see which side is Heads. We toss the coin and observe that it happens to land on 'p'.[12]

Let *h* be the claim that the fair coin lands heads, *pup* be the claim that the letter 'p' lands up on the fair toss, and recall that *p* is the claim about which you have no clue. White then argues as follows. Proponents of thick confidence see your initial take on *p* as something other than credence of ½. White uses the unit interval to frame the discussion:

(1) $\mathbf{O}(p) = [0,1].$

White notes that your initial take on *h*--in line with the Principal Principle--should match its pre-toss chance:

[11] See Levi [1974], Kaplan [1998] or Joyce [2005].
[12] Personal communication, emphasis White's.

(2) $\mathbf{O}(h) = ½$.

But when you see the letter 'p' land up on the fair toss, White says, you see nothing to warrant a shift in your take on *p* or on *h*. Your views of those propositions should stay constant. So

(3) $\mathbf{O}(p) = \mathbf{N}(p)$

and

(4) $\mathbf{O}(h) = \mathbf{N}(h)$.

Once 'p' is seen on the fair toss, however, you can be sure that *h* and *p* have the same truth-value: either both true or both false. Once 'p' is seen on the fair toss, after all, you can be sure that either you see a heads-up coin and *p* is true, or you see a heads-down coin and *p* is false. This means we have

(5) $\mathbf{N}(h) = \mathbf{N}(p)$.

But now we face contradiction: if you haven't changed your mind about *p* or about *h*—as **(3)** and **(4)** jointly ensure—but you have ended with the same view of them—as **(5)** ensures by itself—then you must have started out with the same view of those propositions; but that is jointly ruled out by **(1)** and **(2)**.

White blames the bother on thick confidence as such—on the idea, in essence, that such confidence can ever be warranted in cases like his. He suggests that the problem here crops up the moment **O** assigns *p* a range of values centred on ½; and this is one reason why reflection on evidential symmetry in his case leads him to call into question the epistemic *bona fides* of thick confidence as such.[13]

By way of reaction, let a <u>*case*</u> be any scenario which involves *h*, *p* and a coin-labeller as in White's scenario. Let us think carefully about the update of *h* in the full constellation of cases. Doing so will make several things clear, three of which are emphasized in what follows:

(A) Cases with initial thick confidence for *p* immediately generate a *prima facie* puzzle;

(B) Intuition about the full range of such cases generates an even deeper puzzle;

(C) Respecting that intuition leads to a principled critique of the orthodox model of thick confidence.

I turn to the points in order.

<u>(A) A *prima facie* puzzle.</u>

Note first that thick confidence is central to any puzzle there might be in the area. Purely credal cases—i.e. cases with initial credence for *p* rather than thick confidence—present no puzzle at all. Consider three of them:

[13] Personal communication.

pup			*pup*			*pup*	
	pup			*pup*			*pup*

$\mathbf{O}(p) = 1/3$	$\mathbf{O}(p) = 2/3$	$\mathbf{O}(p) = 1/2$
$\mathbf{O}(h) = 1/2$	$\mathbf{O}(h) = 1/2$	$\mathbf{O}(h) = 1/2$
$\mathbf{N}(h) = \mathbf{N}(p)$	$\mathbf{N}(h) = \mathbf{N}(p)$	$\mathbf{N}(h) = \mathbf{N}(p)$
$\mathbf{O}(p) = \mathbf{N}(p)$	$\mathbf{O}(p) = \mathbf{N}(p)$	$\mathbf{O}(p) = \mathbf{N}(p)$
$\mathbf{O}(h) > \mathbf{N}(h)$	$\mathbf{O}(h) < \mathbf{N}(h)$	$\mathbf{O}(h) = \mathbf{N}(h)$

In cases like these it is obvious that you should conditionalise on *pup*. This is why fully credal cases pose no philosophical difficulty, and also why Probabilism handles them well. The standard model for credence makes predictions exactly in line with strong pre-theoretic intuition.

But consider the full range of cases with an initially balanced attitude taken to *p*—call these "balanced cases". Let the full range start with the case exhibiting 50% initial credence for *p*, move into cases with greater and greater initial thick confidence for *p*—always centred on 1/2 to preserve balance, of course—and then end with the case actually used by White: the case with maximally thick initial confidence in *p*. As we have just seen, there is no difficulty about the initial case in the range: it is clear in the fully credal case that you should conditionalise on *pup*. The moment we step away from that case, however—the moment we look at balanced cases with initial thick confidence for *p*—we face a *prima facie* puzzle. This is so because three principles are true in any such case; and their joint truth is very puzzling indeed.

The first principle concerns your initial take on *h* and on *p*. In all balanced cases—exhibiting initial thick confidence for *p*, of course—the following will be true by stipulation:

(Diff-Attitude) Different initial attitudes will be taken to *h* and to *p*.

In any such case you will start with 50% confidence in *h* and a balanced thick confidence for *p*. Your initial take on the claims will be distinct, and that is why (Diff-Attitude) will be true by stipulation.

The second principle concerns a conditional certainty you should have once the description of a balanced case is absorbed; for any case whatsoever—and thus any balanced case—will be described so that the following is true:

(Cond-Equivalence) The truth of *pup* will be initially seen as conditionally sufficient for the equivalence of *h* and *p*.

Once you have digested the mechanism connecting *h*, *p* and *pup* in a case, after all--once you have absorbed the fact that a coin-labeller knows the truth-value of *p* and writes 'p' on the heads side of a fair coin exactly if *p* is true--you should be initially certain that *h* and *p* have the same truth-value on the assumption that 'p' lands up on the fair toss. (Cond-Equivalence) follows from that description straightaway. Hence the principle applies to any case with balanced initial thick confidence for *p*.

The third principle concerns whether the truth of *pup* has any bearing--by your lights in a case--on the truth-value of *h* or of *p*. The following principle will be true of any case by stipulation:

(No-Relevance) The truth of *pup* will be initially seen as irrelevant to the truth-value of *h* and the truth-value of *p*.

It is part of our description of a case that the truth-values of *h* and *p* have nothing to do with one another. This is why (No-Relevance) is true for any case with initially balanced thick confidence for *p*. It is true for any case at all by stipulation.

But now we can locate a *prima facie* puzzle about any balanced case with initial thick confidence in *p*. In any such case you will begin with differing takes on *h* and *p*, you will begin certain that *h* and *p* have the same truth-value on condition that *pup* is true, but you will also begin certain that *pup*'s truth has no bearing on *h* or on *p*. No wonder balanced cases with initial thick confidence for *p* call into question the epistemic *bona fides* of thick confidence! One wants to ask: "How could it possibly be that distinct attitudes are ideally warranted for a pair of claims which are equivalent on a certain condition when that very condition is seen as having no bearing on the two claims in question?"[14] It is not obvious that this is rationally possible--to put it mildly—and that is one reason why balanced cases with initial thick confidence for *p* generate a worry about thick confidence. They call into question the idea that such confidence could ever be warranted for an ideally rational agent.

(B) Digging Deeper.[15]

But recall the range of balanced cases glossed earlier. It begins with the fully credal case, moves into cases with more and more balanced initial thick confidence for *p*, and then terminates with the case actually used by White. Every case in the range but the first generates a *prima facie* puzzle. In my view, however, that puzzle is not terribly deep—or perhaps better put: that puzzle is shallow for some cases in the range and deeper for others. Seeing why this is so unearths a deeper puzzle; and that shall prove central to our discussion of the orthodox model of thick confidence.

To begin, consider a pair of *un*balanced cases which exhibit tiny amounts of initial thick confidence for *p*.[16]

[14] Indeed White-like cases look even more puzzling—or even more ingenious, depending on your perspective—when it's realized not only that their description requires **O**($h \leftrightarrow p/pup$) to be 100% but **O**($h \leftrightarrow \neg p/\neg pup$) also to be 100%. White-like cases are basically a set-up in which you start out rationally sure that claims *x* and *y* are fully independent, but also sure that someone has created a fair coin so that the following is true: the expression "*x* and *y* have the same truth-value" is written on one side of the fair coin, the expression "*x* and y have different truth-values" is written on the other side of the fair coin, and you can be rationally sure from the outset that something true will land up on a toss of the fair coin. This is a beautiful thought experiment.

[15] I have changed my mind repeatedly about White's devilish thought experiment. I also believe in induction, of course; so I am fairly sure that I will change my mind about White's case again. Hence I reserve the right to deny ever having said anything in the remainder of this paper!

[16] In each case let a box depict your epistemic space. Think of its horizontal line as dividing that space so that its upper half contains *h*-worlds and its lower half contains ¬*h*-worlds. Pretend the vertical line is really an extremely narrow grey zone—I couldn't get my computer to do that—with the clear region to its left containing *p*-worlds and the clear region to its right containing ¬*p* worlds.

pup	
	pup

$$\begin{aligned} \mathbf{O}(p) &= [.32, .34] \\ \mathbf{O}(h) &= 1/2 \\ \mathbf{N}(h) &= \mathbf{N}(p) \\ \mathbf{O}(p) &= \mathbf{N}(p) \\ \mathbf{O}(h) &> \mathbf{N}(h) \end{aligned}$$

pup	
	pup

$$\begin{aligned} \mathbf{O}(p) &= [.65, .67] \\ \mathbf{O}(h) &= 1/2 \\ \mathbf{N}(h) &= \mathbf{N}(p) \\ \mathbf{O}(p) &= \mathbf{N}(p) \\ \mathbf{O}(h) &< \mathbf{N}(h) \end{aligned}$$

Being unbalanced cases, of course, neither of them fall within the range of balanced cases glosser earlier. But in each case above no detailed story about the update of thick confidence is needed--certainly no formal model is needed--to see that your new information is relevant to *h*. Specifically, it is pre-theoretically clear that your new information is negatively relevant to *h* is the first case above, and it is likewise clear that your new information is positively relevant to *h* in the second case above. In each of these unbalanced cases is it pre-theoretically obvious that your new take on *h* should be shaped, somehow, by four bits of your initial take on the set up: your old take on *p*, your old take on *h*, your initial view that the truth-values of *h* and *p* have nothing to do with one another, and your initial take on the coin labeller. In a nutshell: it is pre-theoretically clear, in the unbalanced cases above, that your new take on *h* should be shaped by your old take on *h*, *p* and the set up. Yet that clarity is not itself based on theory or fidelity to model. It is just common-sense. So in the unbalanced cases above it is pre-theoretically plausible that your new view of *h* should *<u>inherit</u>* some thickness from your old take on *p*.

This story applies to any case involving small amounts of unbalanced initial thick confidence for *p*. In any such case it is clear that your new information is actively relevant—either pro or con—to the truth-value of *h*. In any such case it is obvious, therefore, that your new take on *h* should be shaped by your old take on *h*, *p* and the set up. But this very obviousness does not itself come from theory or fidelity to model. It comes from common sense. So in any unbalanced case which exhibits tiny amounts of initial thick confidence for *p*, it is pre-theoretically plausible that your new view of *h* should inherit some thickness from your old take on *p*.

This suggests that your new view of *h* should be likewise fixed in cases with tiny amounts of balanced initial thick confidence for *p*. For example, consider a case like this:

pup	
	pup

$$\begin{aligned} \mathbf{O}(p) &= [.49, .51] \\ \mathbf{O}(h) &= 1/2 \\ \mathbf{N}(h) &= \mathbf{N}(p) \\ \mathbf{O}(p) &= \mathbf{N}(p) \\ \mathbf{O}(h) &\ ???\ \mathbf{N}(h), \end{aligned}$$

Replacement of questions marks here is at worst a spoils-to-the-victor issue. After all, it is plausible that cases which exhibit a given level of balanced initial thick confidence for *p* should be treated the same way as cases which exhibit that same level of unbalanced initial thick confidence for *p*. Whatever the best story turns out to be, for updating very small amounts of initial thick confidence un-spread symmetrically around ½, it is plausible that ***that*** is the story to be told about cases with such confidence spread symmetrically around ½; for it is plausible that balanced cases should be treated like unbalanced cousins. The latter, after all, are like the former in all relevant respects. There is strong pre-theoretic intuition concerning the latter that your new view of *h* should inherit its character from your old take on *h*, *p* and the set up. Whatever story best codifies intuitions about that, it is thus plausible to think, should be applied to cases which exhibit tiny amounts of balanced initial thick confidence for *p*. If that is right, however, then tiny amounts of balanced initial thick confidence for *p* are insufficient for a serious worry about the epistemic propriety of thick confidence.

Let me be explicit about the diagnostic line at work here:

(D) In every case with a tiny amount of unbalanced initial thick confidence for *p*, it is pre-theoretically plausible that your new take on *h* should be unequal to your old take on *h*; for in every such case it is pre-theoretically plausible that your new information is positively or negatively relevant to *h*, and in turn this is so precisely because of your old take on *h*, *p* and the set up—and most saliently, of course, your old take on *p*. But every case with a tiny amount of balanced initial thick confidence for *p* matches members of a class of similar cases exhibiting just its level of unbalanced initial thick confidence for *p*. All members of that class intuitively lead to updating of *h* which thickens your initial take on the claim. So that is what should happen in balanced cases which match them. In every case with a tiny amount of balanced initial thick confidence for *p*, therefore, it is pre-theoretically plausible that your new take on *h* should be unequal to your old take on *h*. At a minimum: what to do about *h* in such cases is a spoils-to-the-victor issue.

This diagnostic line of thought leads to the view that in every balanced case with tiny amounts of initial thick confidence for *p*, your update of *h* should result in a thickening of your take on that claim.

The next question is whether every balanced case with initial thick confidence for *p* can be treated this way? Can we generalise fully from balanced cases which exhibit tiny amounts of initial thick confidence for *p*? Is it always pre-theoretically clear—or even mostly clear after considered reflection, or indeed even a tiny bit clear after such reflection—that in every balanced case whatsoever your new take on *h* should be thickened by appeal to your old take on *h*, *p* and the set up?

I don't think so.

To see why, recall the range of balanced cases sketched earlier. Let us go through it and say how updating of *h* should proceed in each case. When we do that, our initial verdict will be clear to the last detail; for the range sketched earlier begins with the case which exhibits 50% initial credence for *p*. Our first verdict will thus be that *h* should be updated by conditionalisation. And our first verdict will seem dead obvious down to the last detail. Our next verdicts, however, will not be so clear in detail; but we have seen that their general shape will be clear enough to be getting on with. After all: when it comes to balanced cases exhibiting tiny amounts of initial thick confidence for *p*, the diagnostic line (D) applies. In any such case the update of *h* should yield a thickened attitude toward *h* by appeal to your initial take on *h*, *p* and the set up. The exact details of this are not pre-theoretically clear. The basic shape of the update is pre-theoretically clear.

But consider what happens as we move further down the range of balanced cases, shifting our gaze from those with tiny amounts of initial thick confidence for *p*, focusing instead on cases with larger and larger amounts of such confidence. As we do so, it seems obvious that the diagnostic line (D) becomes less and less intuitive; for as we shift our gaze further down the range it becomes less and less clear that your new take on *h* should be fixed by your old take on *h*, *p* and the set up. This is not because cases come before us which fail to match a relevant class of unbalanced cases. It is rather because intuition about the relevance of new information peters out *in those very unbalanced cases*. Or so it seems to me.

I should be clear about the way I see intuition panning out across the full range of cases sketched earlier. Let me do this by describing intuition in two stages. The first will concern movement from balanced cases with tiny amounts of initial thick confidence for *p* to the balanced case with 50% initial thick confidence for *p*. The second will concern movement from the balanced case with 50% initial thick confidence for *p* to the balanced case with 100% initial thick confidence for *p*.

As we go from balanced cases with tiny amounts of initial thick confidence for *p* to the balanced case with 50% initial thick confidence for *p*, intuition seems to shift from strongly supporting the diagnostic line at (D) to full neutrality about it. As we move down this bit of the range, in other words, intuition seems to shift from strongly supporting the idea that your new take on *h* should be thickened by your old take on *h*, *p* and the set up to full neutrality about that idea. But this change in intuition does not result from the cases in question failing to match a relevant class of unbalanced cases—namely, those with identical levels of initial thick confidence for *p*—for the cases to hand do match such unbalanced cases in all relevant respects. What happens, rather, is that as we go from balanced cases with tiny amounts of initial thick confidence for *p* to the case with 50% initial thick confidence for *p*, support for the diagnostic line at (D) goes to ground with respect to the unbalanced cases mentioned in (D). That is why supporting intuition for (D) peters out with respect to the balanced cases before us, why intuition shifts from full support for (D) to neutrality towards it as we move down this bit of the range.

Moreover, as we go from the balanced case with 50% initial thick confidence for *p* to such cases exhibiting ever larger amounts of initial thick confidence for *p*—arriving eventually at the devil-case used by White—intuition seems to shift from full neutrality about the diagnostic line at (D) to full rejection of that line. But here too the change does not result from cases before us failing to match relevantly-similar unbalanced cases. Cases before us do match such unbalanced cases in all salient respects. What happens, rather, is that as we go from the balanced case with 50% initial confidence for *p* to the case actually used by White, pull toward rejection of (D) builds up a head of steam concerning the unbalanced cases mentioned in (D). That is why intuition cuts against (D) more and more strongly as we move across balanced cases before us, why intuition shifts from full neutrality about (D) to complete rejection of the line.

The facts sketched in the previous two paragraphs make for a deep puzzle about the epistemology of cases. Consider the case in the middle of the mess: the case with 50% balanced initial thick confidence for *p*. By my lights, *no* approach to the update of *h* is intuitively compelling in this case—not even after considered reflection—but we can say something systematic about the way intuition pans out as we proceed from this neutral starting point. After all, we can say this much: thickening your old view of *h* by appeal to your initial take on *h*, *p* and the set up seems more and more intuitive as a case exhibits less and less initial thickness in confidence for *p*; and thickening your old view of *h* by appeal to your initial take on *h*, *p* and the set up seems less and less intuitive as the case in question exhibits more and more initial thickness in confidence for *p*. A systematic point can be made about the way intuition plays out across cases:

(🗝) The level of pre-theoretic plausibility which attaches to the idea that your new view of *h* should inherit its character from your old take on *h*, *p* and the set up, in a given case, is itself inversely proportional to the case's level of initial thickness in confidence for *p*.

When the level of initial thickness in confidence for *p* is low in a given case, the level of pre-theoretic plausibility which attaches to the idea that your new view of *h* should inherit its character from your old take on *h*, *p* and the set up is itself high. When the level of initial thickness in confidence for *p* is high in a given case, the level of pre-theoretic plausibility which attaches to the idea that your new view of *h* should inherit its character from your old take on *h*, *p* and the set up is itself low. And so on.

Why is that? Why is the level of pre-theoretic plausibility involved here inversely proportional to the level of initial thickness in confidence for *p* in a given case? What makes that so? As we shall see, the answers to these questions shed light both on the epistemology of cases and the orthodox model of thick confidence. Making this clear will be my last task.

(C) Diagnosing Cases and Orthodoxy.

Since the intuitions behind (🗝) will prove central to what follows, I shall refer to them as "key intuitions". My aim will be to accept those intuitions with common-sense piety, as it were, and use them to guide thought about the epistemology of cases. The effort will be bound by other constraints too, of course—and we'll make them explicit in due time—but the pull of key intuitions will take pride of place in the discussion to follow.

Now, it is normally said—within probability-based epistemology—that when a rational person is certain, on condition that *y* is true, that *x* is true as well, and then that rational person learns nothing but that *y* is true, she should become certain that *x* is true as well. In symbolic form, the view is that whenever this is the case

$$\mathbf{P}(x/y) = 100\%,$$

so is this

$$\mathbf{P}_y(x) = 100\%,$$

where $\mathbf{P}_y$ is got by starting with $\mathbf{P}$, becoming certain of exactly *y*, and then digesting the epistemic upshot of the news. Call this the Update Thesis. Let us take a moment and say what the Thesis amounts to.

How confident you are of one thing on condition another is so is itself called a "conditional confidence". The Update Thesis is the idea that conditional confidence marks rational disposition to update after receipt of information. It is basically the idea that conditional confidence marks how one piece of information bears evidentially on another piece of information by one's lights. That is its cash value within probability-based epistemology.

We can use this to work back to White's puzzle for an arbitrary case with initial thick confidence for p. After all, we have seen that there is an initial conditional certainty that you should have in any case whatsoever:

(ICC) $\mathbf{O}[(h\leftrightarrow p)/pup] = 100\%$.

After taking on board the mechanism connecting h, p and pup a case, after all--namely, the fact that a coin labeller knows whether p is true and writes 'p' on the heads side of the fair coin exactly if p is true--you should be certain that h and p have the same truth-value on condition that pup is true: on condition, in other words, that the letter 'p' lands up on the fair toss.

By the Update Thesis, h and p should be thought equivalent once pup is learned by itself. For our purposes, this will be known as the ***pivot application*** of the Update Thesis. Its aptness for any case results in a generalisation of principle **(5)**—namely, the view that in a given case your new view of h should equal your new view of p:

(New-*h*=New-*p*) $\mathbf{N}(h) = \mathbf{N}(p)$.

Once it is granted, however, that you should have the same take on h and p after pup is learned by itself, it simply follows that one of two things must also be true: either you started with the same view of h and p, or you changed your mind along the way somewhere.

The first option is jointly ruled out by a generalisation of **(1)**—in effect, the idea that thick confidence is applicable in cases:

(Thick-confidence) $\mathbf{O}(p) = [a,b]$,

together with a generalisation of principle **(2)**—the idea that in any case whatsoever your initial take on h should match your initial certainty about its pre-flip chance:

(Initial-chance-credence) $\mathbf{O}(h) = \frac{1}{2}$.

The second option is jointly ruled out by a generalisation of principle **(3)**—the idea that in any given case there should be no change in your view of p:

(No-change-in-*p*) $\mathbf{O}(p) = \mathbf{N}(p)$,

together with a generalisation of principle **(4)**—the idea that in any give case there should be no change in your view of h:

(No-change-in-*h*) $\mathbf{O}(h) = \mathbf{N}(h)$.

These five principles cannot all be true, as we have seen, and thus we arrive at a generalisation of White's puzzle. It crops up for any case with initial thick confidence for p. Given the pivot application of the Update Thesis: you cannot rationally begin with the initial conditional confidence mentioned earlier, rationally differ in initial confidence lent to h and p, learn only that pup is true, yet fail to change your take on h

or on p. Doing so lands you in a position in which you have differing takes on claims the equivalence of which you are certain. That is not rationally possible.

Now, as mentioned earlier there are fixed points in any reasonable discussion of this puzzle. For one thing, it is clear that in any case whatsoever you should have the initial conditional confidence mentioned in **(ICC)**; so that principle will be accepted in what follows. For another thing, it is clear that in any case whatsoever the pivot application of the Update Thesis is correct; so the principle deriving from that application—namely, **(Same-new-*h*/*p*)**—will also be accepted in what follows. And for still another thing: it is clear that in any case whatsoever your initial take on h should match its pre-flip chance; so **(Initial-chance-credence)** will be taken for granted without further ado.

But I want to defend the epistemic *bona fides* of thick confidence in light of the puzzle before us; so **(Thick-confidence)** will be assumed in what follows. This fact--and the fixed points just mentioned--jointly force the rejection of **(No-change-in-*p*)** or **(No-change-in-*h*)**. They do not, however, force a uniform reaction to cases. They only force the view that every case is such that one of the principles just mentioned is rejected. No uniform approach is obligatory.

This is a good thing, of course, since key intuitions cut against a uniform reaction to the puzzle before us. When they are very strong—toward the two ends of the range of balanced cases with initial thick confidence for p—key intuitions pull in opposite directions. When faced with a balanced case exhibiting tiny amounts of initial thick confidence for p, intuition says that the orthodox model of thick confidence gives a good treatment the case. When faced with a balanced case exhibiting very large amounts of initial thick confidence for p, intuition says that the orthodox model of thick confidence gives a bad treatment of the case. How shall we make sense of this Janus-faced verdict?

Well, one way to do so is by appeal to a principle I call the Supposition Test for conditional confidence. The basic idea of the Test is simple: conditional confidence should equal suppositional confidence. More explicitly: for any confidence lent to a claim c, on condition a claim a is true, the Supposition Test says that the confidence in question should equal in strength confidence lent to c under the express supposition that a is the case. In still other words:

$$\text{(ST)} \qquad \mathbf{con}(c/a) \; = \; \mathbf{con}(c)_{\mathbf{sup}(a)}.$$

Whenever you are 80% sure of c on condition that a is true, for instance, you should be 80% sure of c when you expressly suppose that a is true and then reason about c under that supposition; and *vice versa*. More generally: for any type of confidence **con**, when your confidence in c on condition that a is true is itself **con**, your confidence in c should be **con** when you expressly suppose that a is the case and then reason about c under that supposition; and *vice versa*. I shall take this as read in what follows. [17]

Now, we have seen that key intuitions indicate the orthodox model of thick confidence does well in some cases and poorly in others. The Supposition Test

[17] The Supposition Test is modelled, of course, on the Ramsey Test for indicative conditionals. On the latter Test: confidence lent to such a conditional ($a \rightarrow c$) should equal in strength confidence given to c on condition that a is true. In her groundbreaking work on English conditionals, Dorothy Edgington routinely assumes that the left- and right-hand sides of the Supposition Test are notational variants of one another. That gets the psychology wrong, by my lights; but spelling out why would be too involved for present purposes. See Sturgeon [2002] and [in preparation] for related discussion.

clarifies what is going on. When an ideal agent harbours a particular conditional confidence, after all, this fact about her will itself be bound up with many other factors in her epistemic profile. We can recover those factors by looking at the express suppositional reasoning associated with her conditional confidence. If her confidence for *x* given *y* is largely shaped by her take on *z*, for instance, this will come out in the suppositional wash. When she expressly supposes that *y* is true and then wonders whether *x* is true as well, her reasoning about that—within her supposition—will be largely resolved by her view of *z*. The latter will be imported into her suppositional reasoning and put to work in fixing her suppositional take on *x*. We can thus "peer into" her conditional confidence by examining her suppositional reasoning. I shall use this technique to examine the extent to which orthodoxy about thick confidence fits with key intuitions.

To see how this works, suppose you are the protagonist in White's actual case. Suppose further that you decide to work out—after absorbing the details of the case, but before the coin flip—your confidence in *h* on the express supposition that *pup* is true. In the event, there are two natural ways to reason. One fits with the orthodox model of thick confidence; a better way does not fit with that model. The former can be vocalized thus:

<u>Orthodox</u>

> Suppose the fair coin lands with the letter 'p' facing up. What does that mean for whether it has also landed heads up? Well, the answer to that question turns entirely—relative to my assumption—on whether the coin labeller has put the letter 'p' on the heads side of the coin. But that turns solely—under present assumptions—on whether *p* is true. So the answer to my question turns entirely on whether *p* is true. Unfortunately, I have no clue about whether *p* is true. So I have no clue about whether the coin lands heads on present assumptions.

This way of answering your suppositional question leads to this kind of suppositional commitment:

$$\mathbf{O}(h)_{\mathbf{sup}(pup)} = [0,1].$$

By the Supposition Test, it follows that you have a fully thick initial confidence for *h* given *pup*:

$$\mathbf{O}(h/pup) = [0,1].$$

That is just what the orthodox model says your old take on *h* given *pup* should be in White's actual case.

But here is a better way to think about things:

<u>Unorthodox</u>

> Suppose the fair coin lands with the letter 'p' facing up. What does that mean for whether it has also landed heads up? Well, the answer to this question turns entirely—relative to my assumption—on whether the coin labeller has put the letter 'p' on the heads side of the coin. But whether he had done that turns solely on whether *p* is true. So the answer to my question, under present assumptions, turns entirely on

whether *p* is true. Unfortunately, I have no clue about whether *p* is true. So I have no clue about something I see as fully decisive—relative to my assumptions—the answer to my suppositional question. But I do know other things, of course; and some of them seem relevant to that question. In particular, I know that the chance of heads *used* to be 50%. That fact does not fix or determine whether the coin lands heads, under present assumptions; but it is does play a salient epistemic role nonetheless—so much so, in fact, that I'm 50% sure that the coin lands heads on the assumption that it lands with the letter 'p' up.

This line of thought leads to the following suppositional commitment:

$$\mathbf{O}(h)_{\mathbf{sup}(pup)} = \tfrac{1}{2}.$$

By the Supposition Test, you start out 50% sure of *h* given *pup*:

$$\mathbf{O}(h/pup) = \tfrac{1}{2}.$$

This conflicts with the orthodox model of thick confidence; for as we have seen, that model predicts that your old take on *h* given *pup*—in White's actual case—should be maximally thick. In turn the model makes this prediction precisely because you start out with a maximally thick take on *p*.

The orthodox model gives a counter-intuitive verdict here. But what is intuition being sensitive to? Why does the orthodox model seem to go wrong in White's case? This can look puzzling because the orthodox model works intuitively well in cases with tiny amounts of initial thick confidence for *p*; and the orthodox model works univocally throughout all cases whatsoever. Despite these facts, the orthodox model intuitively trips over cases with large amounts of initial thick confidence for *p*. So our question is this: why does intuition turn around fully across the range of balanced cases? Why does it give the orthodox model a stamp of approval in one bit of that range, hesitate and fall silent about the orthodox model in another bit of that range, and cut sharply against the orthodox model when it comes to cases with large amounts of initial thick confidence for *p*? I close with a story about that.

The story results from the interplay of three points. One is a thesis defended in §3, to wit, that thick confidence is a located grade of suspended judgement. One is a point accepted by nearly everyone in epistemology, to wit, that confidence of any kind—thick or thin, sharp or fuzzy, conditional or unconditional—is ideally an all-things-considered phenomenon. And one is a point about the special way that suspended judgement relates to the fixation of all-things-considered commitments. This last point is not readily familiar, so I turn to its gloss next.

The point can be well introduced by appeal to an example concerning rational belief, disbelief and suspended judgement. Suppose you are working through a question: pondering, say, whether a given claim *c* is true. You realise that the truth-value of *c* depends entirely on the truth-value of another claim *d*. If *c* is true, by your lights, that will be solely because *d* is true; and if *c* is false, by your lights, that will be solely because *d* is false. Suppose further that you take a particular coarse-grained attitude toward *d*—belief, disbelief or suspended judgement. What follows about your take on *c*?

Well: if you believe *d* then you should also believe *c*, for you accept something decisively favouring *c* by your lights. And similarly: if you disbelieve *d* you should also disbelieve *c*, for you reject something the falsity of which decisively favours ¬*c* by your lights. If you have no *c*-independent reason to accept or reject *d*, however, it's open to you--so far as *d* goes--to adopt any attitude whatever to *c*. The most rational course will depend on other epistemic commitments you have to hand, commitments about things less directly relevant to *c* by your lights, and the way those things relate to *c*'s truth-value.

Belief, disbelief and suspended judgement are meant to apply—in the ideal, anyway—only after everything to hand has been considered. When *d* is decisive for you concerning the truth-value of *c*, a non-neutral stance toward *d* trumps all else in the fixation of your take on *c*. That is just what it means to say that *d* is decisive for you concerning the truth-value of *c*. But a neutral stance toward *d* does not work that way. It does not trump all else. Non-neutral commitments--pro and con--automatically flows across decisive relevance. Neutral commitment does not do so. That is why suspended judgement in *d* does not straightaway infect your take on *c* even when *d*'s truth-value is decisive, by your lights, to *c*'s truth-value. Suspended judgement is committed neutrality; and neutrality does not automatically flow across decisive relevance.

This asymmetry of epistemic function springs from the fact that belief, disbelief and suspended judgement are meant to be *ultima facie* verdicts. When a rational person adopts one of them, therefore, her take is meant to reflect everything she has to hand. Even when she can locate a factor decisively relevant to a question of interest, neutrality toward that factor leaves space for other commitments to form a rational basis for a non-neutral stance on her question. A non-neutral stance about a decisive issue settles a question for which it is decisive. A neutral stance about a decisive issue does not do anything like that. A neutral stance permits non-decisive factors to take pride of place in the fixation of belief.

The same point applies to conditional commitment. Conditional belief, disbelief and suspended judgement are meant to be *ultima facie* conditional verdicts. This makes for a difference to the way that neutral and non-neutral conditional commitments rationally fix conditional belief, disbelief and suspended judgement. For example, suppose you are wondering about the contents of an envelope before you. You may realise that its contents are fixed solely by me, given it's an envelope taken from my desk; but that does not ensure that your best take on the contents of the envelope, on that assumption, turns decisively on your conditional views about what I have done with the envelope. Admittedly: if you believe that I stuff my envelopes with chocolate coins, say, then you'll come to believe that the envelope before you has chocolate coins in it if it's been taken from my desk; and if you disbelieve that I stuff my envelopes with chocolate coins, then you'll come to disbelieve that the envelope before you has chocolate coins in it if it's been taken from my desk. But if you suspend judgement in whether I stuff my envelopes with chocolate coins, it does not follow that you will suspend judgement in whether the envelope has such coins in it if it's been taken from my desk. Other information to hand may rationally fix a non-neutral verdict about that conditional issue.

This asymmetry of epistemic function springs from the fact that conditional belief, disbelief and suspended judgement are meant to be *ultima facie* conditional verdicts. When a rational agent adopts one of these takes on a given claim *c*—on condition that claim *a* is true—her conditional view of *c* will reflect everything relevant she has conditionally to hand. Even when she can locate a factor decisively relevant to *c* by her lights—on condition that *a* is true—neutrality about that factor, on that condition, leaves space for other conditional commitments to form the rational basis of a non-neutral conditional stance toward *c*. In slogan form: conditional non-neutrality about factors conditionally decisive about a claim will always conditionally settle one's take on that claim; but conditional neutrality about such factors will fail to do so. Conditional neutrality about conditionally decisive factors will always leave room for conditionally non-decisive factors to shape conditional belief rationally.

All of this carries over to the epistemology of confidence. Or at least it does if two claims defended here are accepted. One is the view that thick confidence can be ideally warranted by evidence. The other is the view that thick confidence is a located grade of suspended judgement. Once these claims are accepted, a generalisation of the perspective just sketched comes into focus; and with it we can explain certain key intuitions about cases. In doing so two points play out with force.

First: when the truth-value of a claim *c* turns decisively on the truth-value of a claim *d*, by your lights, and you lend a certain level of confidence to *d*--call it **con**--the extent to which **con** should automatically flow over to *c* will itself turn on the extent to which **con** is thick. Since degree of thickness is degree of suspended judgement, and degree of suspended judgment is degree of committed neutrality, degree of thickness reflects the extent to which a given level of confidence should automatically flow across decisive relevance. When a given level of confidence involves only tiny amounts of thickness, that level of confidence involves only tiny amounts of suspended judgement. This means the level of confidence involves only tiny amounts of neutrality in its commitment; and so intuition demands that the level of confidence flows automatically across decisive relevance. When a given level of confidence involves middling amounts of thickness, that level of confidence involves middling amounts of suspended judgement. This means the level of confidence involves middling amounts of neutrality in epistemic commitment; and so intuition hesitates about the degree to which it should flow with right across decisive relevance. And when a given level of confidence involves huge amounts of thickness, that level of confidence involves huge amounts of suspended judgement. This means the level of confidence involves huge amounts of neutrality in epistemic commitment; so intuition rejects the idea that it should flow automatically across decisive relevance. In this last case intuition demands that other factors be consulted; and intuition is happy to permit those factors to play the crucial role in rational fixation of confidence.

Second: when the truth-value of *c* turns by your lights decisively on the truth-value of *d*, on condition that *a* is true, and you lend a level of confidence **con** to *d* on that condition, the extent to which **con** has automatic right to fix your conditional take on *c* will itself turn on the extent to which **con** is thick. For degree of thickness in conditional commitment is degree of conditionally suspended judgement. And degree of conditionally suspended judgment is degree of neutrality in conditional commitment. So degree of thickness in conditional commitment reflects the extent to which that commitment should have epistemic right of way across decisive conditional relevance. When a given level of conditional confidence only involves tiny amounts of thickness, that level of conditional confidence only involves tiny amounts of conditionally suspended judgement, only tiny amounts of neutrality in conditional commitment. It is thus by and large a non-neutral conditional commitment. Intuition demands that it flow automatically across decisive conditional relevance. When a given level of conditional confidence involves middling amounts of thickness, that level of conditional confidence involves middling amounts of conditionally suspended judgement, middling amounts of neutrality in conditional commitment. It sits roughly halfway between neutral and non-neutral conditional commitment. Intuition hesitates over whether it automatically flows across decisive conditional relevance. And when a given level of conditional confidence involves huge amounts of thickness, that level of conditional confidence involves huge amounts of conditionally suspended judgement, huge amounts of neutrality in conditional commitment. It is basically a fully suspended conditional commitment. Intuition rejects the idea that it automatically flows across decisive conditional relevance, demanding instead that other factors conditionally to hand be consulted. In this case, intuition allows—and in certain epistemic settings insists—that those other factors play the dominant role in the rational fixation of conditional confidence.

These two points explain our key intuitions about cases.

To see this, recall the full range of balanced cases. It starts with the case in which your old take on *p* is 50%, moves into cases with tiny amounts of initial thickness in confidence for *p*, proceeds through cases with ever increasing initial thickness in confidence for *p*, and terminates with the case exhibiting maximal thickness in initial confidence for *p*. As we have seen, intuition does an about-face concerning the orthodox model's treatment of cases in the range. Toward its beginning intuition is happy with that treatment; then supportive intuition fades into hesitancy about the model's treatment; then intuition fades into hostility to that treatment. And at the far end of the range—in White's devil-case—intuition fully rejects the orthodox model. This leads to a point emphasized earlier:

(🗝) The level of pre-theoretic plausibility which attaches to the idea that your new view of *h* should inherit its character from your old take on *h*, *p* and the set up, in a given case, is itself inversely proportional to the case's level of initial thickness in confidence for *p*.

The underlying explanation for this fact about intuition can be found in the previous paragraph.

After all: the orthodox model of thick confidence says, for any case whatsoever, that your new take on *h*—after seeing the letter 'p' land up on the fair toss—should equal your old take on *h* conditional on the letter 'p' landing up then. The model says this should be true in every case:

$$\mathbf{N}(h) \ = \ \mathbf{O}(h/pup).$$

Intuition varies considerably when it comes to orthodox treatment of the left-hand side of this equation. In turn that is because intuition varies considerably when it comes to orthodox treatment of the right-hand side of the equation. Specifically: intuition endorses the orthodox approach to $\mathbf{O}(h/pup)$—and thereby $\mathbf{N}(h)$—when a case involves only tiny amounts of thickness in initial confidence for *p*; intuition hesitates concerning the orthodox approach to $\mathbf{O}(h/pup)$—and thereby $\mathbf{N}(h)$—when a case involves middling-strength thickness in initial confidence for *p*; and intuition rejects the orthodox approach to $\mathbf{O}(h/pup)$—and thereby $\mathbf{N}(h)$—when a case involves huge amounts of thickness in initial confidence for *p*.

This happens for a simple reason. The orthodox model insists, in every case, that an agent set her conditional confidence in *h* given *pup* as if she worked through the *sub*-optimal kind of suppositional reasoning discussed earlier. The model insists, in every case, that the agent set her confidence in *h* given *pup* in line with this sort of suppositional reasoning:

General Orthodox

> Suppose *pup* is true. What does that mean for whether *h* is true? Well, the answer to that question turns entirely—by my lights and relative to my assumptions—on whether the coin labeller has put the letter 'p' on the heads side of the coin. But that issue turns entirely—by my lights and relative to my assumptions—on whether *p* is true. So the answer to my conditional query turns decisively—by my lights and relative to my assumptions—on whether *p* is true. Since my take on *p* under present assumptions is $\mathbf{O}(p)$, my take on *h* under those assumptions is too.

This way of reasoning leads to the following suppositional commitment:

$$\mathbf{O}(h)_{\mathbf{sup}(pup)} = \mathbf{O}(p),$$

and by Supposition Test, we have this equation holding in every case:

$$\mathbf{O}(h/pup) = \mathbf{O}(p).$$

In a nutshell: orthodoxy about thick confidence has it that your old take on *h* given *pup* equals your old take on *p* given *pup* in every case; and orthodoxy also insists that your old take on *p* given *pup* equals your old take on *p* in every case. [18]

But your old take on *p* varies in its thickness across the full range of balanced cases. At the start of that range your old take on *p* exhibits no thickness at all (being a credence of 50%). Toward the middle bit of that range your old take on *p* exhibits middling-strength thickness; and toward the far end of the range your old take on *p* exhibits large amounts of thickness. This means your old take on *p* given *pup* varies in just the same way. Initially it exhibits no thickness at all—being a conditional credence of 50%--toward the middle of the range it exhibits middling-strength thickness; and toward the far end of the range your old take on *p* given *pup* exhibits large amounts of thickness. And this means, finally, that your old take on *h* given *pup* varies in just the same way: initially it exhibits no thickness at all; then it works slowly to middling-strength thickness; and then it exhibits large amounts of thickness.

In effect, the orthodox model insists in every case that your old view of *h* conditional on *pup* flows automatically from your old view of *p* conditional on *pup*. As we have seen, however, this kind of automatic flow will itself be intuitive only to the extent that two other things are true:

(i) *p*'s truth-value given *pup* is decisively relevant to *h*'s truth-value given *pup*;

and

(ii) confidence lent to *p* given *pup* is not very thick.

The first condition holds in every case; and the second condition holds in cases with tiny amounts of thickness in initial confidence for *p*. As we look past those cases, however, focusing instead on cases with larger and larger amounts of thickness in

[18] A bit more formally: every probability function in the set used by orthodoxy to model your initial epistemic state in a case will set $\mathbf{O}(pup)$ equal to 1/2. So every such function will set $\mathbf{O}(h/pup)$ equal to twice $\mathbf{O}(h\&pup)$; and this means, in turn, that every such function will set $\mathbf{O}(h/pup)$ equal to $\mathbf{O}(p)$.

initial confidence for *p* given *pup*, it becomes ever clearer that condition (ii) fails. That is why intuition stops supporting the orthodox model as we move down the range of balanced cases. That is why intuition demands ever more strongly, as we proceed in this way, that factors other than *p* be consulted—when *pup* is assumed true—in the fixation of your take on *h*.

After all, as we move down the range of balanced cases intuition sees ever more clearly that your initial confidence in *p* given *pup* is shot through with suspended judgement. As we move down the range, in other words, intuition sees ever more clearly that your initial confidence in *p* given *pup* is shot through with neutrality. This is why intuition says more and more loudly, as we proceed down the range, that factors other than your confidence in *p* given *pup* should play a key role—if they intuitively can—in the fixation of your initial confidence in *h* given *pup*.

And naturally enough, those other factors can play an intuitive role; for in every case you are initially certain--given *pup* is true--that the pre-toss chance of the coin landing heads is 50%. As you move down the range of balanced cases, therefore—and your initial confidence for *p* given *pup* gets thicker and thicker, more and more neutral—intuition demands ever more loudly that your old view of *h* given *pup* be set equal to 50%; for intuition demands ever more loudly, as we proceed down the range, that your view of the pre-toss chance of *h* take control in the fixation of your initial take on *h* given *pup*. That is why intuition turns actively against the orthodox model of thick confidence as we proceed down the range of balanced cases rather than simply fading away in its support. As we move down the range, conditionally decisive factors become more and more factors about which you are conditionally neutral. Intuition reflects this by demanding ever more loudly that background information about non-decisive matters be used.

In this way we explain our key intuitions. In cases with only tiny amounts of initial thick confidence for *p*, intuition insists that your new view of *h* be fixed by appeal to your old take on *h*, *p* and the set up. In turn this is because that way of updating amounts to setting your new view of *h* equal, automatically and by right, to a non-neutral value for something aptly decisive for *h* by your lights. Since non-neutral commitment flows intuitively by right across decisive relevance, intuition is happy with orthodoxy about cases exhibiting tiny amounts of initial thick confidence for *p*. In cases with middling amounts of thickness in initial confidence for *p*, however, intuition hesitates over the idea that your new view of *h* should be fixed by appeal to your old take on *h*, *p* and the set up. This is because that way of updating amounts to setting your new view of *h* equal, automatically and by right, to a semi-neutral value for something aptly decisive for *h* by your lights. Since semi-neutral commitment plays no obvious role in the flow of confidence across decisive relevance, intuition hesitates when it comes to the orthodox treatment of cases with middling amounts of thickness in initial confidence for *p*. And in cases with large amounts of thickness in initial confidence for *p*, intuition flat out rejects the idea that your new view of *h* should be fixed by appeal to your old take on *h*, *p* and the set up. This is because that way of updating amounts to setting your new view of *h* equal, automatically and by right, to a neutral value for something aptly decisive for *h* by your lights. Since neutral commitment fails to flow automatically across decisive relevance, intuition rejects the orthodox treatment of cases with large amounts of thickness in initial confidence for *p*.[19]

[19] Note that there is a way of seeing White's actual case—the fully dilated case—on which it is not rationally possible at all, on which it harbours a hidden conflict. Once you take on board the description of the case, after all, you should be certain that *h* and *p* have the same truth-value given

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pup; and you should be sure they have opposite truth-values given ¬*pup*. Intuition says your initial confidence for *h* given *pup* should be 50%; and it says your initial confidence for *h* given ¬*pup* should be 50% too. Once you take on board the description of the case, therefore, you can be sure that new information will arrive—with no other relevant change—so that 50% credence in *p* is called for. Even the most fervent detractor of Reflection should agree that in such a case it is plausible that you should be 50% sure of *p* once you digest the description of White's case. Indeed it looks as if you should become 50% sure of *p* *by virtue of* digesting those details. Insisting on them together with thick confidence for *p*, then, is insisting on the rationally impossible.