# When Beauties Disagree:
# Why Halfers Should Affirm Robust Perspectivalism

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In this paper I present a variant of the "Sleeping Beauty" case that shows that the "halfer" approach to the original Sleeping Beauty problem is incompatible with an extremely plausible principle pertaining to cases of disagreement. This principle says that, in "non-permissive" contexts, the weight you give to a disputant's view ought to be proportional to your estimation of the strength of the disputant's epistemic position with respect to the disputed proposition. In requiring such proportionality, the principle denies the possibility of what I will call "robustly perspectival" contexts. Given the plausibility and widespread acceptance of this principle, its incompatibility with the halfer approach to Sleeping Beauty gives us an apparently powerful new argument against the halfer position and for the alternative "thirder" view.

But I am a halfer, not a thirder. So I go on to argue that despite the principle's intuitive plausibility, there are good reasons for thinking that the case presented here does involve a robustly perspectival context and that the principle should be rejected. I suggest that the lesson that we should draw from this case is *not* that we should accept the thirder view, but rather that rationality can be perspectival in a robust way that many may find quite surprising.

## 1. Disagreeing Beauties

The original "Sleeping Beauty" case features Sleeping Beauty and some experimental philosophers who put her to sleep and then subject her to a certain number of awakenings and to memory tampering that erases the memory of one or more of these awakenings (Elga 2000; more on this case later). The case that will be the primary focus of this paper involves not one "Beauty" but four: Alvin, Brenda, Claire, and Dillon, who have each agreed to spend the night in the infamous Experimental Philosophy Laboratory.[1] Before they are put to sleep, the four subjects are brought together and informed of what will happen over the course of the evening. By means of random selection, one of the four subjects will be selected as the "victim." The experimenters will know the identity of the victim, but will not disclose this

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[1] So named by David Lewis (2001, 171).

information to any of the subjects. At three different times during the night, the experimenters will simultaneously awaken the victim and exactly one of the other subjects. Each non-victim subject will be awakened only once during the night. The victim and the other awakened subject will converse for a time and will be asked to discuss their views about the probable identity of the victim. After each of these conversations, the victim and the other awakened subject will be given a drug that will put them back to sleep and that will also erase their memory of the awakening. So while the victim will be awakened three times, there will be no way for the victim to determine whether a given awakening is the first, second, or third awakening. And while the non-victim subjects will be awakened only once, during their awakenings they will have no way of knowing whether they are in their first and only awakening or whether they are the victim and possibly in a second or third awakening. Steps are taken to make sure that there are no differences between waking experiences of the victim and those of the non-victims that might serve as clues as to the identity of the victim. (So it is not the case, for example, that one of the awakened subjects will feel especially tired or "drugged up" in comparison to the other awakened subject.) When the morning arrives, all four of the subjects will be woken up at the same time and sent on their way, none of them possessing any memories of their awakening (or awakenings) during the preceding night. After being made certain of all of these features of the experiment, the subjects are put to sleep in the lab and the night begins.

Let us suppose that Alvin, Brenda, Claire, and Dillon are each ideally rational agents, and that they know this about one another. It is clear that at the moment after Claire has learned the setup of the experiment but before the subjects have been put to sleep for the night, her credence that she will be the victim will be 0.25. And when Claire and the other subjects are leaving the lab the next morning, her credence that she was the victim will again be 0.25. But suppose that sometime during the night, the experimenters awaken Claire and as she opens her eyes, she sees that Dillon is also being woken up at the same time. At that moment, what should Claire's credence be for the proposition that she is the victim?

Intuitively, Claire's credence that she is the victim should not change during this awakening, but should remain 0.25. For before she went to sleep, Claire knew that she would be awakened sometime during the night, whether or not she turned out to be the victim. So the fact that she is awakened provides no reason to change her estimation of the likelihood that she is the victim. And no features of Claire's awakening will be evidence that she is the victim, since she knows that the experience of non-victim subjects will be just like the waking experiences of the victim. And clearly, the fact that this particular awakening is with *Dillon* as opposed to Alvin or Brenda should have no impact on how confident Claire is that she is or is not the victim. It seems, then, that Claire has not gained or lost any evidence that is relevant to determining the likelihood that she is the victim. And the following **relevance principle** seems to be a very basic principle of rationality: if I start off with a credence for *p* that is maximally rational given my evidence, and if I neither gain nor lose any evidence that is relevant to the likelihood of *p*, then I should not change my credence for *p*. The relevance principle and the "no new evidence" reasoning just

rehearsed together imply that Claire's credence for the proposition that she is the victim ought to remain 0.25.

I will explore an objection to the above line of reasoning later in the paper. But for the moment, let us assume that the reasoning just presented is correct, and that an ideally rational agent like Claire will, during her awakening or awakenings, continue to have a credence of 0.25 for the proposition that she is the victim. If this is right, then upon seeing that Dillon is being awakened at the same time, Claire's credence for the proposition that Dillon is the victim ought to go up from 0.25 to 0.75. For since Claire knows that in any given awakening, one of the two awakened subjects must be the victim, she knows that the victim is either Dillon or herself. Given that she assigns a 0.25 credence to the proposition that she is the victim, probabilistic coherence requires that her credence that Dillon is the victim be 0.75. And this increase in her credence for Dillon's being the victim does *not* seem to be in tension with the relevance principle. For while it seems that Claire has not learned anything that ought to increase her suspicion of herself, in seeing that Dillon is her co-waker it is clear that she *has* learned something that ought to increase her suspicion of Dillon.

Since Dillon is, like Claire, a perfectly rational agent, he will reason in an analogous way. This means that, upon being awakened and seeing that Claire is being awakened at the same time, Dillon will maintain his 0.25 credence for the proposition that he is the victim and raise his credence for the proposition that Claire is the victim to 0.75.

We have, then, a case of disagreement. And it is a most perplexing one. For starters, the disagreement is not the result of one party possessing better evidence than the other, or of one party processing their evidence more rationally. For the case is perfectly symmetrical: Claire and Dillon know that the other possesses equally strong evidence and that they are both perfectly rational in how they respond to that evidence. Second, it seems to make no difference if Dillon and Claire go to the effort of fully and perfectly disclosing all of their reasons for their view. For since Dillon and Claire share in common all of the knowledge and information that led them to their views, and since they both know that they are equally informed and equally rational, discussing their reasons with one another will not reveal anything about the other's reasoning and views beyond what could already be anticipated. Claire will already know that Dillon will employ reasoning that is exactly analogous to hers, and Dillon will likewise know that Claire will engage in reasoning just like his. So discussion and debate will not bring about any changes in their respective levels of confidence.

It would be natural to describe the disagreement as follows: Claire and Dillon are mutually acknowledged "epistemic peers" who have the exact same evidence and who are perfectly confident that the other person is reasoning impeccably, and yet they are nonetheless rational in remaining steadfast and dismissing the view of their disputant.[2] But one might reasonably question whether we should describe Claire and Dillon as having the same evidence. For while Claire and Dillon can affirm the same "third person" facts about the way the world is, they obviously cannot make the same "first-person" affirmations about their own "location" within this world. Claire, for example, can assert that she opened her eyes and saw Dillon, while Dillon cannot

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[2] The term 'epistemic peer,' popular in the disagreement literature, was first introduced by Gutting (1982).

assert this (though he can of course agree that *Claire* opened her eyes and saw Dillon). And if we suppose that Claire and Dillon will in fact disagree about the likelihood that Claire is the victim, then this seems to be a case where the credence that Claire should have for a hypothesis expressible in *third-person* terms is in part determined by Claire's *first-person* information about who she happens to be and thus what her vantage point on the world is. Since first-person information might possess such rational significance in this case, I do not want to simply assume that Claire's and Dillon's total relevant evidence is exhausted by their third-person information. Rather, I want to allow that the relevant evidence in this case could include information that is irreducibly "first-person." Following others, I will use '**uncentered information**' to refer to purely "third-person" information about the world that in no way implies anything about my "location" in that world (e.g., who I am and where I am in space and time). **Centered information**, on the other hand, has at least some bearing on my location in the world. The extent to which two subjects can share their centered information is limited. For example, though Claire and Dillon can both affirm the centered proposition, "I am in the lab," Claire can truly affirm, "I am Claire," while Dillon cannot.

While Claire and Dillon cannot make all of the same first-person affirmations and thus do not share all of their centered information, this in no way should prevent them from acknowledging one another as epistemic peers. For clearly neither Claire nor Dillon have any reason to think that they possess some sort of epistemic advantage merely in virtue of being who they are. It would be ludicrous for Claire to think that, simply due to the fact she happens to be Claire and not Dillon, she is more likely than Dillon to have accurate views on the identity of the victim. Surely *being Claire* can be considered epistemically advantageous only if we think there is some *other* epistemically relevant factor (whether access to more evidence, greater intelligence, possession of a particular insight, or whatever) that distinguishes her and Dillon. But we are supposing that they know there to be perfect parity with respect to such matters. So neither Claire nor Dillon can take their centered information to confer some sort of epistemic advantage. We can say, then, that Claire and Dillon are mutually acknowledged epistemic peers who perfectly share their *uncentered* evidence and yet rationally disagree.

The mere fact of rational disagreement between mutually acknowledged epistemic peers would not be surprising if we suppose that there are "permissive contexts," contexts where, for one or more disagreeing subjects, the evidence and other rational factors bearing on *p* do not determine one credal attitude that is maximally rational for that subject to have towards *p*.[3] But it seems fairly clear that this is a *non*-permissive context where there is one maximally rational credence for

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[3] Note that given the way I am using 'permissive,' denying that there are permissive contexts does not amount to accepting the "Uniqueness Thesis" endorsed by Feldman (2007) and others. To deny that there are permissive contexts is equivalent to affirming that, for any given person and proposition, there is exactly one maximally rational credal attitude for that person to have towards the proposition. But the Uniqueness Thesis goes further than this, holding that for any two subjects with the same evidence, the *very same* credal attitudes are maximally rational. So using the terminology I will employ here, we can say that the Uniqueness Thesis denies both the possibility of "permissive" contexts *and* the possibility of "perspectivalist" contexts.

Claire and one maximally rational credence for Dillon (even if there is, as we shall see, some debate as to what their credence assignments should be and whether or not they will differ). Even given that some context is non-permissive, one might think that rational disagreement between mutually acknowledged epistemic peers should not be particularly surprising in cases where those peers are not aware of the disagreement. For plausibly, the credence for $p$ that is rationally required of a subject might in some cases depend not only on the evidence, but also on other factors (e.g. a subject's prior probability for $p$) that could vary from one rational subject to another. The rationally required credence could, in other words, depend not only on the evidence but also on certain features of a given subject's perspective. But even if we accept this modest "perspectivalist" supposition, this does not give us a reason for thinking that there can be rational disagreement between mutually acknowledged epistemic peers in a non-permissive context where the peers are fully aware of the other's view. For it is hard to see how someone could justifiably prefer her own credence for $p$ while thinking that someone else's position on $p$ is epistemically just as good as her own. So it *would* be surprising if there were a case where, in a *non-permissive* context, someone rationally maintains her view despite *knowing* that someone who is her epistemic peer on the matter holds a different view. But if I am right that Claire and Dillon will rationally disagree about the likelihood that Claire is the victim, then the multiple Beauties is precisely such a case.

Let us say that a context involving a dispute over some uncentered proposition $p$ is **robustly perspectival** if and only if it is a non-permissive context where (i) there is full communication between two disputants and perfect sharing of their uncentered evidence, (ii) each disputant knows with full confidence that the other disputant possesses the same uncentered evidence and processes that evidence perfectly rationally, and (iii) the final credence for $p$ that is rationally required of one disputant differs from the final credence for $p$ rationally required of the other disputant. And let us use the label **robust perspectivalism** to refer to the view that there are robustly perspectival contexts. If it is true that Claire and Dillon will disagree upon awakening, then there are robustly perspectival contexts and robust perspectivalism is correct. As I will show in the next section, robust perspectivalism is incompatible with an intuitively plausible principle that is often taken for granted in discussions of the epistemic significance of disagreement.

## 2. The epistemology of disagreement and the rule of proportionality

In this section, I characterize a highly intuitive epistemic principle that bears on disagreement and show that this principle is incompatible with the view that Claire ought to maintain her credence of 0.25 for the proposition that she is victim.

If I am highly confident that $p$ and my disputant is highly confident that ¬$p$, consistency requires that I also believe that I am right about $p$ and that my disputant is wrong about $p$. This is trivial and obvious. But can I rationally affirm that I am right and my disputant wrong while also affirming that my disputant is in at least as strong an epistemic position with respect to $p$ as I am? Arguably not, at least not if we understand the strength of one's epistemic position as taking into account *all* the

dimensions of epistemic evaluation that bear on the likelihood of one's arriving at a reasonable position on $p$ in the present circumstances, so that the strength of one's epistemic position takes into account such factors as the general reliability of one's cognitive faculties, the current level of functioning of those faculties, the presence or absence of any errors in reasoning, the presence or absence of bias, the quality and quantity of one's evidence, and the adequacy of one's overarching "epistemic framework." To be sure, there is nothing contradictory in affirming both that my disputant is in at least as strong an epistemic position with respect to $p$ and that I am right and my disputant is wrong. For sometimes the epistemically disadvantaged can get lucky. An expert in probability theory may think it highly likely that in a particular series of coin tosses at least one coin has landed heads, and a toddler may firmly believe, without any evidence, that all of them have landed tails. It may turn out that, as luck would have it, the toddler is right. Nonetheless, the probability expert was clearly in a stronger epistemic position with respect to the question. But even if it is not contradictory to affirm both that I am right and that my disputant is in at least as strong an epistemic position, such an affirmation is nonetheless epistemically problematic. For if I think that the superiority of my view on $p$ is not due to any epistemic advantage I have over my disputant (such as greater insight or superior evidence), then I must think that my having the superior view is a matter of epistemic luck. But I cannot justifiably believe that I am lucky in this way without good evidence that I am lucky. Suppose I have such evidence. If my disputant does *not* have this evidence, then this gives me reason for thinking that, in the present circumstances, my epistemic position with respect to $p$ is superior. And if my disputant *does* have the evidence that I am the lucky one but does not give it proper weight, then this *also* gives me reason for thinking that my epistemic position is, on balance, superior (since I take my disputant to have improperly assessed a piece of evidence that ought to significantly shape her credence for $p$). So it seems that I cannot reasonably be confident that $p$ while also thinking that my disputant's epistemic position with respect to $p$ is at least as strong as my own.

The above line of reasoning suggests that there is some sort of **rule of proportionality** governing my confidence in $p$ in the face of disagreement over the plausibility of $p$: the weight I give to my initial opinion regarding $p$ and to my disputant's initial opinion regarding $p$ ought to be proportional to my assessment of the strength of our epistemic positions with respect to $p$. To the extent that I think my epistemic position is stronger, I should weight my opinion regarding $p$ more heavily, and to the extent that I think my disputant's epistemic position is stronger, I ought to weight her opinion regarding $p$ more heavily.

It is important to see that the rule of proportionality does *not* require that I assess my and my disputant's epistemic credentials in a way that is independent of my views on the disputed matter. *That* requirement, often called the "independence" requirement, is quite controversial and leads straightaway to the "conciliatory" position on disagreement (Christensen 2009, 758). But the rule of proportionality is completely open to the possibility, defended by opponents of conciliationism, that the reasoning behind my belief that $p$ may serve to ground my judgment that those who dispute $p$ suffer from some sort of epistemic disadvantage (e.g., that they are prone to a certain error in reasoning, have some sort of cognitive defect, lack some piece of

evidence, etc.) and are for that reason in a weak epistemic position with respect to *p*. Both conciliationists and anti-conciliationists can, then, affirm that my being steadfast in the face of disagreement is reasonable only if I think that my side of the dispute is in a stronger epistemic position.

Most parties to the current debate over the epistemic significance of disagreement seem to take it for granted that the rule of proportionality is correct, or at least that it is correct in non-permissive contexts. If I am in a *permissive* context, and if I think that both my and my disputant's levels of confidence are in the range that is rationally permissible for me, then arguably I can remain steadfast in my level of confidence without thinking that my epistemic position is superior in some way.[4] But even if there are permissive contexts (which is controversial[5]), it seems that opposing sides in the disagreement debate are for the most part united in their acceptance of what we can call MODEST PROPORTIONALITY, which is the view that in non-permissive contexts, the rule of proportionality applies.[6]

There are, to be sure, epistemological positions that have adherents and that arguably conflict with MODEST PROPORTIONALITY. For example, MODEST PROPORTIONALITY might be incompatible with certain strong forms of "epistemic conservatism" that maintain that the fact that I believe *p* is a very resilient reason in favor of my continuing to believe *p*.[7] And certain forms of epistemic relativism, according to which there are no objective epistemic standards according to which the correctness of different "epistemic systems" can be measured, might be in tension with the underlying motivations for MODEST PROPORTIONALITY.[8] But most philosophers currently engaged in the disagreement debate, even those who are not friendly to conciliationism, have not taken such approaches. They have typically eschewed views on rationality that are explicitly perspectivalist, preferring instead views that are least moderately "objectivist." And those coming from such a perspective will be inclined to accept MODEST PROPORTIONALITY. What is interesting about the multiple Beauties case is that it challenges MODEST PROPORTIONALITY without relying on any premise (such as epistemic conservatism or relativism) that explicitly conflicts with a more objectivist understanding of rational norms. I will now make that challenge explicit.

MODEST PROPORTIONALITY implies that there cannot be a non-permissive context where two subjects, after discovering their disagreement over *p*, rationally maintain different credences for *p* despite knowing with certainty that their epistemic

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[4] Goldman (2010, 195–6) briefly argues for this possibility, as does Kelly (2010, 118–119)

[5] For arguments against permissive contexts, see White (2005).

[6] That conciliationists affirm MODEST PROPORTIONALITY is rather obvious. See, e.g., Feldman (2006), Elga (2007), and Christensen (2011). Several anti-conciliationists also affirm something along the lines of MODEST PROPORTIONALITY. Lackey (2010, 277, 281–2), for instance, suggests that confidence in the face of disagreement requires that there be some "symmetry breaker," a reason for thinking that one's own epistemic situation is favorable to that of one's disputant. Along similar lines, Bergmann (2009, 342) thinks that reasonable steadfastness requires thinking that one is *probably* "internally" or "externally" more rational than one's disputant. Van Inwagen (2010) argues in favor of several principles that are consonant with MODEST PROPORTIONALITY, though he stops short of firmly endorsing an anti-conciliatory view. Also see Enoch (2010, 975) and Fumerton (2010, 99).

[7] For a critical discussion of different versions of epistemic conservatism, see Vahid (2004).

[8] This characterization of epistemic relativism is based on Boghossian's discussion in (2006, 73).

positions with respect to *p* are equally strong. While MODEST PROPORTIONALITY is perfectly compatible with a subject's responding to a disagreement over *p* by concluding that her disputant is not in fact equally qualified to assess *p*, on the assumption that each subject continues to know that the other subject is equally qualified and that the context is non-permissive, MODEST PROPORTIONALITY would require that both of the subjects give equal weight to the other's initial view. And if they both give equal weight to the other's view, then they will of course have the same final credence for *p*. So any initial difference in confidence levels will disappear after full communication. MODEST PROPORTIONALITY thus implies that there are no robustly perspectival contexts. But, as already discussed, the view that Claire and Dillon will disagree about the likelihood that Claire is the victim implies that there are robustly perspectival contexts. So if we are to affirm that Claire and Dillon will disagree, then we must reject MODEST PROPORTIONALITY.

If I am correct in maintaining that MODEST PROPORTIONALITY is incompatible with the view that Claire and Dillon will rationally disagree, we have two options: deny that Claire and Dillon will disagree, or deny MODEST PROPORTIONALITY. I will now show that the first of these two options is available to those who advocate the "thirder" position on the original Sleeping Beauty case. For arguments for the thirder position, when adapted to the multiple Beauties case, support the conclusion that Claire and Dillon will agree on the likelihood that Claire is the victim. But those who advocate the alternative "halfer" position on Sleeping Beauty will be under rational pressure to conclude that Claire and Dillon will disagree, and thus that MODEST PROPORTIONALITY is false.

## 3. Agreeing Beauties? Why thirders and halfers should disagree on whether Claire and Dillon will disagree

There are two basic positions on the original Sleeping Beauty problem: the "thirder" position and the "halfer" position. I will now argue that while "halfers" ought to affirm that Claire and Dillon will disagree, "thirders" ought to say that Claire and Dillon will not disagree but will both assign a credence of 0.5 to the proposition that Claire is the victim. Thus, the multiple Beauties case presents no problem for thirders, who can in fact use the case as a new argument for the thirder position, an argument that gains its strength from the apparent plausibility of MODEST PROPORTIONALITY. To show why halfers should maintain that Claire and Dillon will disagree and thirders should maintain that they will agree, I will describe the original Sleeping Beauty case, present the principal argument for halfer position and one of the principal arguments for the thirder position, and show that analogous arguments in the multiple Beauties case lead halfers and thirders to disagree about whether Claire and Dillon will agree or disagree about the likelihood that Claire is the victim.

The original Sleeping Beauty case goes as follows. Sleeping Beauty is a perfectly rational agent who is about to be put to sleep on Sunday night by some experimental philosophers. The experimenters inform her that she will either be awakened twice (on Monday and Wednesday, when the experiment ends) or three times (on Monday, Tuesday, and Wednesday), depending on the outcome of a coin toss. If the coin lands

heads, Beauty will be awakened only on Monday and Wednesday. If the coin lands tails, Beauty will be awakened on Monday, Tuesday and Wednesday. Sleeping Beauty does not know the result of the coin toss, and thus does not know the number of awakenings she will experience. Moreover, the experimenters inform Beauty that she will have no way of distinguishing a Monday awakening from a Tuesday awakening. In order to make these waking experiences indiscernible, the experimenters will erase Beauty's memory of her Monday awakening before putting her back to sleep, so that if she awakens on Tuesday, she will not know whether this is her first or second awakening. But Beauty will be able to immediately distinguish a Wednesday awakening from a Monday or Tuesday awakening. (We can imagine that Beauty knows that, upon awakening on Wednesday, she will immediately see a sign that says, "It's Wednesday—experiment over!") The controversial question, which has given rise to a small cottage industry producing papers on the subject, is this: when Beauty is woken up on Monday and experiences an awakening that is indistinguishable from a Tuesday awakening, what should her credence be for the proposition that the coin landed heads? "Thirders" argue that the rational credence is one third; "halfers" contend that it is one half.

Before presenting arguments for the thirder and halfer positions and showing how those arguments translate to the multiple Beauties case, an important clarifying note is in order. It is an unfortunate feature of the multiple Beauties case that arguments for the *thirder* position in the original Sleeping Beauty case support the conclusion that Claire's credence that she is the victim should, upon waking, be *one half*; and the principal argument for the *halfer* conclusion in the original Sleeping Beauty case supports the conclusion that Claire's credence in the relevant proposition should remain *one fourth*. So "halfers" support 1/2 in the original case and should (I will argue) support 1/4 in the multiple Beauties case, and "thirders" support 1/3 in the original case and should support 1/2 in the multiple Beauties case. Having warned you of this potential source of confusion, I will now characterize the principal halfer and thirder arguments and show how they bear on the multiple Beauties case.

The principal consideration in favor of the halfer solution to the Sleeping Beauty Problem is that it seems that Sleeping Beauty has not learned anything of evidential significance when she is awakened on Monday. On Sunday, when Beauty's credence for the coin's landing heads was 0.5, Beauty *knew* that she would soon have at least one waking experience that, from her perspective, could either be a Monday awakening or a Tuesday awakening. So it seems that the fact that she is now in the midst of such an episode does not give her any new evidence relevant to the outcome of the coin toss. And if this is right, then application of the relevance principle leads us to conclude that her credence for heads ought to remain one half. Halfers endorse this "no new evidence" reasoning and the application of the relevance principle, contending that Beauty's credence for the coin's landing heads should not change upon awakening.

Because the same "no new evidence" reasoning that motivates the halfer view also supports the conclusion that Claire ought to keep her credence that she is the victim at 0.25, it seems that halfers are committed to holding that Claire and Dillon will disagree, and thus that robust perspectivalism is true and that MODEST PROPORTIONALITY is false. But there are two reasons one might want to resist our

straightforwardly identifying the view that Claire and Dillon will disagree as *the* halfer view on the multiple Beauties case. First, someone might argue that while halfers are moved by the relevance principle in the Sleeping Beauty case, their commitment to the relevance principle need not be absolute. And perhaps halfers should hold that the relevance principle is trumped by MODEST PROPORTIONALITY, so that the relevance principle holds in the Sleeping Beauty case but not in the multiple Beauties case. I concede that such a position is at least superficially consistent. But it also strikes me as quite ad hoc. The relevance principle seems to be a more basic rational requirement than MODEST PROPORTIONALITY, so it is hard to see why the latter should override the former. And if the relevance principle does admit of exceptions so readily, then it is also questionable whether halfers are reasonable in thinking that it holds in the original Sleeping Beauty case, given the force of the thirder argument to be considered below.

But there is a more legitimate reason why one might want to resist identifying the view that Claire and Dillon will disagree as the halfer position on the multiple Beauties case. Some attempts to give a formalized generalization of the halfer approach (Halpern 2005; Meacham 2008; Briggs 2010) have associated the halfer approach with a policy that, when applied to the multiple Beauties case, does *not* support the conclusion that Claire and Dillon will disagree, but rather supports the conclusion that they will agree (a conclusion that I will associate with the thirder position). This policy, which Rachel Briggs calls the "Halfer Rule," requires "conditionalizing the *uncentered portion* of one's credence function on the *uncentered portion* of one's total evidence, and then within each [uncentered] world, dividing one's credence [for that world] among the doxastically possible centers [within that world]" (Briggs 2010, 9–10). Briggs thinks that halfers will be drawn to the view that only the *uncentered* component of my total evidence is of any relevance in determining the likelihood of some uncentered proposition, and the Halfer Rule requires that one form credences for uncentered propositions in a way that sets aside centered information as irrelevant. Since by hypothesis Claire and Dillon have the same uncentered evidence, clearly they will be in full agreement if they follow the Halfer Rule.

But even though the Halfer Rule does prescribe halfer credences in the original version of the Sleeping Beauty case, halfers have good reasons for rejecting the Halfer Rule as an inadequate characterization of their position. For in many cases, the Halfer Rule delivers prescriptions that are fundamentally at odds with the highly intuitive "no new evidence" reasoning that drives people towards halfer conclusions in the first place (Titelbaum 2008, 591–7; Briggs 2010, 29). Consider, for instance, Titelbaum's "Technicolor Beauty" case (2008, 591–7).[9] In the original Sleeping Beauty case, it was stipulated that Beauty's Monday and Tuesday awakenings are qualitatively identical. The Technicolor Beauty example introduces qualitative differences that are evidentially irrelevant. In Technicolor Beauty, everything is just as it was in the original case except for the following addition. Beauty knows that at the same time the coin is to be tossed on Sunday night, a dice will also be rolled. If the dice roll comes out odd, a red piece of paper will be put in her room before she wakes

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[9] A similar case can also be found in Meacham (2008, 263).

up on Monday and then, after she is put back to sleep, it will be replaced by a blue piece of paper that will be in the room throughout Tuesday. If the dice roll come out even, the colors will be reversed: a blue piece of paper will be put in her room on Monday and a red piece of paper will be put in her room on Tuesday. Beauty knows all of this. Quite clearly, the fact that Beauty sees a red piece of paper upon awakening should make no difference to her credence for the proposition that the coin landed heads. For Beauty knew she would see either a red or blue piece of paper, and a piece of red paper is no more or less likely to be present on a Monday (or on a Tuesday) than a piece of blue paper. So if Beauty's credence for heads in the original case should be 0.5, then it should also be 0.5 in Technicolor Beauty: the "no new evidence" reasoning is just as strong in both cases. But while the Halfer Rule delivers halfer prescriptions in the original case, it delivers *thirder* prescriptions in Technicolor Beauty. This "instability" (Briggs 2010, 27) of the Halfer Rule's prescriptions surely shows it to be mistaken. Those who wish to stick by the halfer view on the original case therefore ought to reject the Halfer Rule and seek a way of generalizing the halfer approach that is more closely aligned with the kind of "no new evidence" reasoning that makes the halfer view so intuitive in the first place.[10] So the Halfer Rule does not, in my judgment, give halfers a good reason for thinking that Claire and Dillon will agree. Instead, halfers ought to stick by the kind of "no new evidence" reasoning that, when applied to the multiple Beauties case, leads to the conclusion that Claire and Dillon will disagree.

I will now show that thirders ought to maintain that Claire and Dillon will find themselves in agreement during their awakening. While all of the arguments that I am aware of for the thirder position can be used to support the conclusion that Claire and Dillon will agree, I will focus here on an argument articulated in the piece by Adam

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[10] For an impressive defense of the halfer view that includes a well-argued diagnosis of the Halfer Rule's flaws, see the recent work of Darren Bradley (2011b; 2012; and especially 2011a).) Bradley's diagnosis of the Halfer Rule may be briefly summarized as follows. First, the evidential significance of my learning some fact *E* depends on the process by which I learned *E*; more specifically, the evidential significance of *E* depends on counterfactual facts about what could or could not have been confirmed had *E* not been confirmed. Conditionalization implicitly assumes that, had *E* not been confirmed, not-*E* would have been confirmed. But when this default assumption does not hold, the relevant counterfactual facts must be explicitly included in one's total evidence in order for conditionalization to yield the correct result. (The Monty Hall problem is a good example of how conditionalization can go wrong when the relevant counterfactual facts are not explicitly included in one's total evidence.) Second, when Beauty opens her eyes and sees a red room (for example), the process by which she learns that she has an awakening in a red room is *not* a process that could have confirmed that she does *not* have an awakening in a red room sometime during the course of the experiment. For if Beauty had opened her eyes and seen a blue room (the only other possibility), she would *not* have thereby learned that she does not wake up in a red room on some day of the experiment. If we specify in the evidence that the evidential selection process can confirm a color Beauty *does* see during the experiment, but cannot confirm that she does *not* see some color during the experiment, then conditionalization will yield halfer credences as we would intuitively expect. But these counterfactual facts about the process of evidential selection are inherently *centered* facts, since it would be possible for someone else to acquire Beauty's uncentered information by means of some different process. Thus, in requiring that one form credences for uncentered propositions by conditionalizing on uncentered evidence, the Halfer Rule prevents Beauty from conditionalizing on all of her relevant evidence.

Elga that introduced the Sleeping Beauty problem to the philosophical community. For purposes of presenting Elga's argument, I'll follow Elga in labeling the three possibilities open to Beauty upon awakening on Monday 'H1,' 'T1,' and 'T2,' with the following chart showing which possibilities are designated by these labels:

|  | HEADS | TAILS |
|---|---|---|
| It's Monday | H1 | T1 |
| It's Tuesday | (Not possible) | T2 |

Let C be Beauty's (perfectly rational) credence function on Monday when she awakens. The thirder position follows from the following two premises:

(1) C(T1) = C(T2)
(2) C(H1) = C(T1)

Since H1, T1, and T2 are mutually exclusive and exhaust all possibilities, we know that C(H1) + C(T1) + C(T2) = 1. From this and from (1) and (2), it follows that C(H1) = C(T1) = C(T2) = 1/3. And since Beauty's credence for HEADS must be equal to her credence for H1, we can further conclude that her credence in HEADS upon awakening on Monday will be 1/3.

Given the absence of any reason for thinking T1 more likely than T2, we have good reason for thinking that Beauty will assign the same credence to each of these two possibilities, and thus that (1) is correct. To be sure, some have contested the general "indifference principles" that have been offered as motivation for (1) (see, e.g., Weatherson 2005).[11] But even if such indifference principles are controversial, most everyone, halfers included, are inclined to accept that *in this particular case*, Beauty ought to assign equal credence to T1 and T2. The primary source of disagreement between halfers and thirders is (2).[12]

Elga's argument for (2) may be summarized as follows. First, since Beauty will be awakened on Monday irrespective of whether the coin comes up heads or tails, we can imagine that the experimenters do not toss the coin until *after* Beauty is awakened on Monday. And whether they do in fact toss the coin on Sunday night or after waking up Beauty on Monday should not, it seems, make any difference to the credences Beauty assigns to H1, T1, and T2. So let's imagine that Beauty knows that the coin is tossed on Monday, just after she is put back to sleep. Now, suppose that sometime after being woken up on Monday, Beauty is told that it is Monday. Upon learning this, Beauty learns that T2 is false, so that her credences for TAILS and HEADS will be identical to her credences for T1 and H1 (respectively). And what should her credences for H1 and T1 be? Well, her credence for H1 must be identical to her credence that a fair coin, *yet to be tossed*, will land heads, and her credence for T1 must be identical to her credence that a fair coin, *yet to be tossed*, will land tails. And

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[11] Briggs (2010, 12) offers a weaker indifference principle that avoids Weatherson's objections and motivates (1) on the condition that Beauty assigns both T1 and T2 some precise non-zero credence.
[12] One exception to this is (Hawley forthcoming). Hawley is a halfer who accepts (2) but denies (1), arguing that it ought to be the case that C(T1) = 0.5 and C(T2) = 0.

surely, Elga contends, one's credence that a *future* toss of a fair coin will land heads should be 0.5. So upon learning that it is Monday, Beauty's credence for H1 ought to be 0.5.

From this, it seems to be a short step to the conclusion that (2) is correct. But I want to draw attention to this step, since it is a step that is frequently contested. Elga asserts the following:

> (3) The credence that Beauty has for H1 *after* learning that it is Monday should be equal to the conditional credence C(H1 | H1 or T1) that she has *before* learning that it is Monday.[13]

Given (3) and the fact that Beauty's credence for H1 after learning that it is Monday should be 0.5, it follows that *before* learning that it is Monday, it ought to be the case that C(H1 | H1 or T1) = 0.5. And from this, it follows that, before learning that it is Monday, it ought to be the case that C(H1) = C(T1), thus completing Elga's argument for (2) and delivering us the thirder result.[14]

We are now in a position to see how an argument that is analogous to the one Elga gives in support of the thirder position can be given in support of the conclusion that, upon waking up together, Claire and Dillon will agree that the probability that Claire is the victim is 0.5. When Claire is awakened and sees Dillon being awakened at the same time, she knows that one of six mutually exclusive possibilities obtain, which I'll label C1–C3 and D1–D3, in accordance with the following chart:

|  | Claire is the victim. | Dillon is the victim. |
|---|---|---|
| It's the victim's 1st awakening. | C1 | D1 |
| It's the victim's 2nd awakening. | C2 | D2 |
| It's the victim's 3rd awakening. | C3 | D3 |

Let '**AGREEMENT**' stand for the proposition that, upon being awakened during the night and seeing Dillon being awakened at the same time, Claire's credence for the proposition that she is the victim will be 0.5. (I'm calling this proposition '**AGREEMENT**'

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[13] It may seem that (3) is an obvious truth (given the setup of the case) that would be backed by any reasonable confirmation theory. But it is not, for two reasons. First, it is controversial whether standard conditionalization applies in cases where what one learns is centered information. See, .e.g., Meacham (2008). Second, (3) expresses a non-controversial truth only if we assume that, in learning that it is Monday, Beauty learns nothing else that is evidentially relevant to HEADS. If Beauty *does* learn something else of evidential significance upon learning that it is Monday, then (3) would be mistaken (Bostrom 2007, 69–70).

[14] We can spell this last step is spelled out more explicitly. C(A|B) must be equal to C(A ∧ B)/C(B) in cases where C(A ∧ B) and C(B) are sharply defined and when C(B) is non-zero (Hájek 2003, 314). So C(H1 | H1 or T1) = C(H1 ∧ [H1 or T1]) / C(H1 or T1) if all of these terms are sharply defined and C(H1 or T1) is non-zero. This latter condition is satisfied on both the halfer and thirder view. So if C(H1 | H1 or T1) = 0.5, then C(H1 ∧ [H1 or T1]) / C(H1 or T1) = 0.5. C(H1 ∧ [H1 or T1]) simplifies to C(H1). And since H1 and T1 are mutually exclusive, C(H1 or T1) must be equal to C(H1) + C(T1). Thus, C(H1) / [C(H1) + C(T1)] = 0.5. From this, only algebra is needed to show that C(H1)=C(T1).

because the exact same argument would also show that Dillon would assign a credence of 0.5 to the proposition that Claire is the victim, thus resulting in his agreeing with Claire.) And let C be Claire's credence function upon awakening and seeing that Dillon is being woken up at the same time. AGREEMENT follows from the following two premises, which are analogous to (1) and (2) above:

(4) C(C1)=C(C2)=C(C3) and C(D1)=C(D2)=C(D3)
(5) C(C1) = C(D1)

Since C1–C3 and D1–D3 are mutually exclusive and collectively exhaustive possibilities, we know that C(C1)+C(C2)+C(C3)+C(D1)+C(D2)+C(D3) = 1. From this and from (4) and (5), it follows that C(C1)=C(C2)=C(C3)=C(D1)=C(D2)=C(D3)=1/6. And since Claire's credence that she is the victim must be equal to C(C1)+C(C2)+C(C3), it further follows that upon awakening, Claire's credence that she is the victim will be 1/2, giving us our conclusion that AGREEMENT is correct.

The same "indifference" reasoning offered in support of (1) above supports premise (4). No matter who the victim is, Claire has no reason for thinking that it is more likely that this is the first (or second or third) awakening for the victim as opposed to either of the other two possibilities. It seems that rationality requires her to assign each of these possibilities equal credence, as (4) requires.

Premise (5), too, can be supported with an argument along the lines of the one given in support of (2). We can imagine that the experimenters select the victim in the following way: first, they randomly select two of the four subjects; then they awaken both of these subjects during the first awakening of the night; and finally, *after* the two subjects have debated the probable identity of the victim and been put back to sleep, they flip a fair coin in order to determine which of the two subjects just put back to sleep will be the victim. It seems that whether the experimenters use this method to select the victim or select the victim ahead of time should make no difference to Claire's credences for C1–C3 and D1–D3. So let's suppose that the experimenters use the two-stage approach to victim selection just described, and that Claire knows this. Now, suppose that sometime after being woken up at the same time as Dillon, Claire is told that this is the first awakening, and that the identity of the victim will be chosen via a coin toss after Claire and Dillon go back to sleep, with Claire being selected if the coin lands heads, and Dillon being selected if it lands tails. Upon learning this, Claire learns that either C1 or D1 is true, so that her credence for her being the victim and her credence for Dillon being the victim will be identical to her credences for C1 and D1 (respectively). And since her credence for C1 must be identical to her credence that a fair coin, *yet to be tossed*, will land heads, and her credence for D1 must be identical to her credence that a fair coin, *yet to be tossed*, will land tails, it seems that upon being told that this is the first awakening and the victim has yet to be selected, Claire's credence for C1 (and for D1) ought to be 0.5.

Again, we need one more *apparently* innocuous premise in order to conclude that (5) is correct:

(6) The credence that Claire has for C1 *after* learning that it is the first awakening should be equal to the conditional credence C(C1 | C1 or D1) that she has *before* learning this information.

Given (6) and the reasoning just rehearsed, it follows that *before* learning that it is the first awakening of the night, it ought to be the case that C(C1 | C1 or D1) = 0.5. And from this, it follows that, before learning that it is the first awakening, it ought to be the case that C(C1) = C(D1), completing the argument for (5) and thus for AGREEMENT.

Given that thirders will think that Claire and Dillon will be in perfect agreement, thirders can continue to affirm MODEST PROPORTIONALITY. And given the intuitive appeal of MODEST PROPORTIONALITY, the fact that thirders can readily affirm it and halfers cannot (at least not without abandoning the principal motivation for their position) constitutes a new and not insignificant reason in favor of the thirder position. But however plausible MODEST PROPORTIONALITY may at first appear, I will argue that there are good reasons for thinking that the multiple Beauties case does involve a robustly perspectival context, and that MODEST PROPORTIONALITY is therefore false. If I am right, halfers should not be worried by the fact that the halfer approach can conflict with MODEST PROPORTIONALITY.

## 4. Evidential selection procedures and perspectival rationality

We can summarize the challenge to the halfer position in the following way. If we consider the perspective of Claire, there is an intuitive line of reasoning that leads to the conclusion that there is a 0.75 chance that *Dillon* is the victim. And if we consider the perspective of Dillon, an exactly analogous line of reasoning supports the conclusion that there is a 0.75 chance that *Claire* is the victim. But clearly we, as third party observers of Claire's and Dillon's situation, have no reason for privileging either Claire's or Dillon's perspective over the other's. To prefer one side or the other would be completely arbitrary. We ought therefore to assign an equal probability to Claire's being the victim as to Dillon's being the victim. But (and here is the critical though misguided move) Claire has no more reason than we do for privileging her own perspective over Dillon's. Or at least she has no more *epistemic* reason than we do for privileging her perspective. For the mere fact that a perspective happens to be hers rather than Dillon's is no reason for thinking that that perspective will better serve the aim of true belief and accurate credences. Given that Claire knows that neither she nor Dillon possess any epistemic advantage over the other, privileging her own perspective would amount to arbitrarily selecting one out of two perspectives that, from a disinterested point of view, are equally likely be the more reliable guide to the identity of the victim. Rationality, it seems, would require that such arbitrary selection be avoided and that perspectives with equal epistemic standing be given equal weight. Thus, the halfer view on the multiple Beauties case, and the "no new evidence" reasoning that motivates that view, ought to be rejected as fallacious.

Against the above line of reasoning, I will claim that Claire's privileging her own perspective is not epistemically arbitrary, but is rationally required given the appropriate background assumptions about the process by which Claire has come to

acquire the evidence she receives during her awakening with Dillon. I am not the first to argue that the rationally-required credences can vary for two people even in contexts where the uncentered information that grounds those credences is shared by both parties. Arnold Zuboff (2000) and Nick Bostrom (2000) have both offered examples in support of this perspectivalist claim. But the robust perspectivalism that I will argue for using the multiple Beauties case goes beyond the merely moderate perspectivalism implied by Zuboff's and Bostrom's examples. For as I argue in the footnotes, in the examples of Zuboff and Bostrom, the perspectivalist results depend on the inability of the multiple parties to share certain bits of uncentered information that, while not evidentially relevant itself, cannot be shared without generating *new* evidence that *would* lead both parties to converge on the same credences.[15] So for these examples to yield results that could plausibly be called "perspectivalist," it must be assumed that the parties with opposed views cannot communicate. The examples

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[15] Zuboff explicitly acknowledges that in his example communication between the disagreeing subjects must be disallowed in order for the example to yield a (moderately) perspectivalist result. While Bostrom's example yields a perspectivalist result only if we assume that communication is not possible, Bostrom does not explicitly stipulate that there is no communication. But Bostrom does argue that the perspectivalist results do not support the possibility of mutually-agreeable bets between the disagreeing parties (105-6). And the same reasoning that shows why there are no mutually-agreeable bets also shows that the differences in credences will not persist through communication and the full sharing of uncentered information. To see why the perspectivalist result is undermined by the full sharing of uncentered information, consider the following case, which is structurally just like Bostrom's case. Suppose that in an experiment some scientists leave me on a desert island in the middle of an undisclosed ocean. I know the following: first, if a particular coin flip conducted by the scientists came up heads, then one subject has been left on a desert island in the Indian ocean and one subject has been left on a desert island in the Pacific ocean; if it came up tails, then one subject has been left on a desert island in the Indian ocean and *ten* subjects have been left on ten different desert islands in the Pacific ocean; second, each subject has an electronic device that at 12:00 a.m. on January 1st will display which ocean they are located in; third, no subjects will have any evidence beyond this that can help them determine which ocean they are in. Now suppose that at 12:00 a.m. on January 1st, my device informs me that I am in the Indian Ocean; at the same time, Fiona, another subject, gets her message indicating that she is in the Pacific ocean. According to Bostrom, I should at this point be more confident than Fiona that the coin landed heads. For the chance of my being the one person in the Indian Ocean is much more likely given heads than it is given tails. But Fiona knows that *someone* has just learned that he (or she) is in the Indian Ocean. But since *she* is not that person, it should not have the same rational import (for her) as my learning that *I* am in the Indian Ocean. And of course I know that at least one person has just learned that his or her island is in the Pacific. But this knowledge does not have the same import (for me) as Fiona's learning that *her* island is in the Pacific. So centered information is the difference-maker here. Nonetheless, the perspectivalist results depend on imperfect sharing of uncentered information. For suppose that somehow Fiona and I were able to share all of our uncentered information. In this case, I would know not only that some subject is on an island in the Pacific, but also that *Fiona* is on an island in the Pacific. And Fiona would know that I know this. But now, Fiona has a new piece of evidence that is relevant to heads or tails: namely, that while I know that *Fiona* is on a Pacific island, I do not know the names of any other subjects on Pacific islands. And from Fiona's perspective, the chance of my knowing about *her* as opposed to some other subject is much more likely given heads (in which case, she is the only Pacific island subject I *can* know about) than it is given tails (in which case, there is only a one in ten chance that Fiona would be the only subject I know about). With this new evidence made possible by our sharing all of our uncentered information, Fiona's credence for heads will converge with my credence for heads. Essentially, communication often enables interlocutors to gain evidence about how representative they and their perspective are, and this evidence undermines any pre-communication perspectivalism.

therefore do not establish the possibility of *robustly* perspectival contexts. The kind of perspectivalism implied by these examples is thus less surprising, and less significant to the epistemology of disagreement, than the robust perspectivalism for which I will now argue. Still, the diagnosis of the multiple Beauties case that follows can be understood as an application and elaboration of some of the insights of Zuboff and Bostrom.

To understand why the credences that are rational for Claire and Dillon are perspective-dependent, it will be helpful to consider cases where certain facts about the evidential selection procedure give a third party reason for preferring either Claire's or Dillon's perspective. Suppose that the experimental philosophers have concluded their experiment with Alvin, Brenda, Claire, and Dillon, and after their results are recorded into a database, the experimenters allow you to make certain queries of the database and to see the answers the database returns. You have no knowledge concerning the identity of the victim other than what you learn in response to your queries. Suppose, first, that you ask the database to randomly select one of the four subjects and show you that subject's name, and in response to this query the database program displays the name "Claire." Now suppose you ask the database to take the subject whose name was just displayed and display the name of exactly one person who shared an awakening with this subject. (So if Claire was not the victim, in responding to this query the program will display the name of the only person Claire woke up with, i.e. the victim, and if Claire was the victim, the program will randomly select one of the other subjects who each shared an awakening with Claire.) In response to this second query, the program displays the name "Dillon." Let's call the procedure just described "Procedure 1." It is uncontroversial that if Procedure 1 is the only basis for your knowledge that Claire shared an awakening with Dillon, then you should have a 0.75 credence for the proposition that Dillon is the victim. For in response to the first query, three times out of four the program will display the name of someone who was *not* the victim, which means that the next query will display the name of the victim (since every non-victim shares an awakening only with the victim). Matters would have been very different if instead you had employed Procedure 2, where Procedure 2 consists in your directing the database program to randomly select one of the awakenings and then display the names of the two subjects involved in that awakening. If you had learned by Procedure 2 that Claire and Dillon shared an awakening, you would know that one of these two was the victim, but would have no basis for thinking either one of them is more likely to be the victim than the other.

Interestingly, Procedure 1 and Procedure 2 are both random procedures that are equally likely to result in your learning that Claire and Dillon shared an awakening; for Procedure 1 is equally likely to turn up information about the subjects in the first awakening as it is the second or third awakening. Nevertheless, if Procedure 1 is your method for arriving at the information that Claire and Dillon shared an awakening, it would be irrational for you to respond to this information as though all you had learned was that a randomly-selected awakening involved Claire and Dillon. For you have learned something else that is evidentially relevant, namely that Dillon was a "co-waker" of the subject you randomly selected. This additional knowledge changes the rationally required response. The key point, one recently defended by Darren

Bradley (2012), is that the process by which the evidence was selected is often itself a critical piece of evidence. And if this process is not known, background views and assumptions about the *likely* process will often play a critical role in determining the rational response to a piece of evidence.

Claire's epistemic situation upon awaking with Dillon is, I will argue, relevantly like that of someone who, employing Procedure 1, has randomly selected Claire from among the four subjects and then learned that Dillon is a co-waker of this randomly-selected subject. So upon waking up and seeing Dillon, Claire is justified in adopting the same credences as someone who has employed Procedure 1. Of course it is true that Claire did not randomly select herself from among four subjects. Nor is it possible, given the constraints of the experiment, for Claire to randomly choose one of the subjects in order to learn the identity of one of that subject's co-wakers. Since Claire is not privy to information about any awakenings that do not involve herself, she cannot expect to learn the identity of any particular subject's co-wakers except for herself. So Claire's epistemic situation is relevantly like someone who has employed Procedure 1 only if she is justified in thinking of herself as a "randomly" selected subject. Claire can, I suggest, legitimately think of herself this way. Even though Claire is constrained in which of the subjects she is able to learn about, and even though this constraint biases Claire toward learning one of her own co-wakers rather than another subject's co-wakers, this biasing constraint does not undermine the analogy between Claire's situation and Procedure 1. For the fact that constrains Claire to "select" herself is probabilistically independent of whether or not Claire is the victim. And such probabilistic independence is all that the "randomness" of Procedure 1 was meant to achieve. Given the lack of probabilistic correlation between Claire's reason for selecting herself and the identity of the victim, Claire may legitimately think of herself as a "randomly" selected subject.

To help illustrate why such probabilistic independence is sufficient, imagine that instead of using the researchers' database to carry out Procedure 1, you are going to randomly select one of the four subjects and hypnotize that subject in order to retrieve the memory of one (randomly selected) forgotten awakening. To your dismay, it turns out that Alvin, Brenda, and Dillon are not susceptible to hypnosis. Claire, however, is able to be hypnotized. As long as you know that whether a subject is susceptible to hypnosis is probabilistically independent of whether that subject was the victim, then there is no problem in your thinking of Claire as a "randomly selected" subject. Upon hypnotizing her and learning the identity of a randomly-selected co-waker, the rational implications will be the same as Procedure 1 as originally described. Similarly, Claire's reason for "selecting" herself has to do with centered facts about her identity and the epistemic constraints imposed by the game—facts that have no probabilistic correlation with Claire's being the victim. Thus, it seems that Procedure 1 is a fully adequate model for Claire's situation and that her credences should be identical to someone who has employed Procedure 1, randomly selected Claire, and then learned that Dillon is a co-waker of Claire's.

Of course Dillon is also justified in treating himself as a randomly-selected subject and in adopting the credences of someone who, performing Procedure 1, selected Dillon randomly and then learned that Claire is a co-waker of Dillon's. And since Claire knows this, one might think that Claire's epistemic situation is best modeled by

someone who has performed Procedure 1 twice, the first time selecting Claire and then learning that Dillon is a co-waker, and the next time selecting Dillon and learning that Claire is a co-waker. If this were the best model of Claire's situation, then it would indeed be the case that Claire ought to put equal credence in her being the victim and in Dillon's being the victim. But it would be a mistake for Claire to think that her situation is analogous to the situation of someone who has performed Procedure 1 twice. For not only is the "selection" of Dillon from the other subjects not random, but the fact that accounts for the selection of Dillon *is* probabilistically correlated with whether Dillon is the victim. To see why, first note that given the constraints imposed by the experiment, at any given moment, Claire can know the identity only of her own current co-waker and the identity of her current co-waker's current co-waker (which will always be herself). So the fact that explains why Claire knows the identity of a co-waker of Dillon's (rather than knowing a co-waker of Alvin's or Brenda's) is the fact that she has woken up with Dillon. And clearly this fact *is* probabilisticially correlated with the identity of the victim, since having an awakening with Dillon is three times more likely if Dillon is the victim than if he is not the victim.

We are now in a position to appreciate why the rational credences are perspectival in this case, despite the perfect sharing of all uncentered evidence. The evidential significance of the information that Claire and Dillon share an awakening depends on the process by which that information has been acquired. If the process yields information about a co-waker of *Claire's* for reasons that are probabilistically independent of whether or not Claire is the victim, then the evidential significance of the information will be different than if the process yields information about a co-waker of *Dillon's* for reasons that are probabilistically independent of whether or not Dillon is the victim. Learning that Claire and Dillon share an awakening by the first kind of process (as in an instance of Procedure 1 where Claire is the randomly-selected subject) can have no bearing on the likelihood of Claire's being the victim, and learning this information by the second kind of process (as in an instance of Procedure 1 where Dillon is the randomly-selected subject) can have no bearing on the likelihood of Dillon's being the victim. But whether or not one has learned this evidence by a process of the first type or of the second type (or by some other type of process, like Procedure 2) depends on features of one's causal history that can vary from one subject to another. Thus, the rational significance of the evidence can depend on one's observational standpoint. Such seems to be the case in the multiple Beauties example. Claire and Dillon can share all of their uncentered information, but they cannot share their causal histories and thus cannot share the same observational standpoint. As a result, the evidential significance of their shared information differs for each of them, and different credences are called for.

## 5. A harder case?

In the previous section, I gave what I take to be a satisfactory justification for the striking perspectivalism that halfers seem committed to in the multiple Beauties case. But I would now like to briefly look at another variant of the Sleeping Beauty case that is arguably more difficult for halfers to accommodate. Like the multiple Beauties

case, this case also shows that halfers are committed to a surprising disconnect between how we assess one's epistemic credentials and how much weight we give their views.

Let us suppose that alongside Sleeping Beauty during her time in the Experimental Philosophy Laboratory is a second subject named Informed Beauty. Informed Beauty will be put to sleep at the same time as Sleeping Beauty, and he will be awakened on Monday at the same time as Sleeping Beauty and then put to sleep at the same time after this awakening. But no matter what the outcome of the coin toss, Informed Beauty will be awakened on Tuesday, either along with Sleeping Beauty if her coin landed tails, or by himself if her coin landed heads. Another critical difference between Informed Beauty's situation and Sleeping Beauty's situation is this: Informed Beauty will not be subject to any memory tampering, and both he and Sleeping Beauty know this. So when Informed Beauty is awakened on Monday, he will know that it is Monday, and likewise when he is awakened on Tuesday. Unfortunately, the two Beauties are not allowed to communicate, so Sleeping Beauty cannot benefit from Informed Beauty's information.

Like Sleeping Beauty, Informed Beauty is known to be a paragon of rationality. Given that this is the case, it seems that when Sleeping Beauty awakens along with Informed Beauty on Monday morning, she ought to regard Informed Beauty as an "expert" (relative to her) with respect to the probability of HEADS, where someone is an **expert** on $p$ relative to $S$ just in case his epistemic position with respect to $p$ is at least as good as $S$'s in every respect (including possession of evidence, rationality of judgment, and functioning of cognitive faculties) and is superior to $S$'s in at least one respect. Sleeping Beauty ought to regard Informed Beauty as an expert because he has every piece of evidence that Sleeping Beauty has, is just as rational as Sleeping Beauty, and possesses one piece of pertinent knowledge that Sleeping Beauty does *not* have: namely, knowledge of what day it is. Since knowledge of what day it is is relevant to assessing the likelihood of HEADS (since if one knows that it is Tuesday and whether or not Sleeping Beauty is awake, one can confirm whether HEADS or TAILS is true), it seems that Sleeping Beauty ought to prefer Informed Beauty's credence to her own, and thus ought to mirror Informed Beauty's credence as best as she can. For it seems that rationality requires that our current credences "reflect" the credences of acknowledged experts. Specifically, the following seems to be a rational constraint:

> EXPERT REFLECTION: My current credence for $p$ should not differ from the expected value of the credence for $p$ that would be had by someone who is an expert on $p$ relative to myself.

Like the Rule of Proportionality, EXPERT REFLECTION requires that my credences be consistent with my views on the epistemic credentials of myself and others.

EXPERT REFLECTION seems extremely plausible, as does the claim that Sleeping Beauty ought to regard Informed Beauty as an expert. But halfers must reject one of these claims or embrace an extremely implausible version of the halfer view. To see why, suppose that upon awakening, Sleeping Beauty's credences for H1, T1, andT2 are those endorsed by most halfers: 0.5, 0.25, and 0.25, respectively. What will Sleeping Beauty's expected value be for Informed Beauty's credence for HEADS? Well, if it is Monday, then Informed Beauty will not know if the coin landed heads or tails and will surely have a credence for HEADS of 0.5. And if it is Tuesday, then Informed

Beauty will know this (since he'll remember the Monday awakening the day before), and, upon seeing that Sleeping Beauty is awake, will assign HEADS a credence of 0. Since Sleeping Beauty believes with 0.75 confidence that it is Monday, her expected value for Informed Beauty's credence for HEADS is $0.75 \cdot 0.5 + 0.25 \cdot 0 = 0.375$. Since this value differs from Sleeping Beauty's credence for HEADS of 0.5, Sleeping Beauty will violate Expert Reflection if she takes Informed Beauty to be an expert relative to her with respect to HEADS.

It can be shown that the only positions that do allow Sleeping Beauty to reflect Informed Beauty's credences are those that maintain that her credence for H1 will be equal to her credence for T1.[16] So thirders have no problem accommodating EXPERT REFLECTION in this case. An "inertial halfer" position that maintains that, upon awakening on Monday, Beauty ought to be certain that it is Monday (with a credence of 0.5 for H1 *and* a credence of 0.5 for T1) also has no problem accommodating the view that Sleeping Beauty ought to reflect Informed Beauty's credences. But while this view has at least one defender (Hawley forthcoming), I think most would judge it exceedingly implausible. On the assumption that we can set inertial halfism aside, the halfer is left with two options: deny EXPERT REFLECTION, or deny that Sleeping Beauty ought to count Informed Beauty as an expert.

While I concede that EXPERT REFLECTION is extremely plausible upon first inspection, I shall argue that there are cases where the one should not reflect the credences of known experts, and further suggest that Informed Beauty is such a case. To see why EXPERT REFLECTION is false, consider the following case. Suppose that Bill's guardian angel has a list of 100 propositions and has been given the following instructions: for any proposition on the list that is *false*, make it the case that Bill encounters absolutely conclusive evidence for the falsity of the proposition, and that he rationally processes this evidence; for any proposition on the list that is true, however, do nothing to influence Bill's evidence concerning the proposition or his opinion about it. I know this about Bill, and I also know that $p$ is on the list. Bill, however, knows nothing of this. But let's suppose that the fact that I know that $p$ is on the list and that his guardian angel is carrying out these instructions does not in itself give me any evidence bearing on $p$. (An implication of this supposition is that I have no knowledge of what Bill thinks about $p$; for if I knew that Bill was not absolutely confident that $p$ is false, then I could deduce that $p$ must be true.) Finally, suppose that I know that, absent any interference from Bill's guardian angel, Bill will have the exact same evidence bearing on $p$ that I have, and that he will process it no more or less rationally than I do.

It seems clear that I should regard Bill as an expert in the sense stipulated above. For Bill has the property of "having superior evidence bearing on $p$, and arriving at a true belief on the basis of that evidence, if $p$ is false," a property which I lack and which surely strengthens Bill's epistemic position with respect to $p$. (Accuracy in credences can only be improved by possession of such a property.) Of course if circumstances changed, I could be an expert relative to Bill. If, for instance, I heard Bill confess that he thinks $p$ is true, I would then be in a position to deduce that $p$ is in

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[16] Let C be Sleeping Beauty's credence function; Sleeping Beauty will reflect Informed Beauty's credences if and only if $C(H1) = (C(H1)+C(T1)) \cdot 0.5 + T2 \cdot 0$. Solving, we get H1 = T1.

fact true, and Bill would not be able to do this without knowledge of his guardian angel's scheme. But in a situation where I do not know what Bill thinks about $p$, and where my knowledge of the guardian angel's scheme in no way gives me evidence for or against $p$, Bill is surely an expert on $p$ relative to myself.

But this is a case where I should *not* conform to the dictates of EXPERT REFLECTION. For because Bill's expertise is skewed towards a particular direction, so that he is an expert relative to me in ascertaining reasons why $p$ is false (if there are such reasons) but not in ascertaining reasons why $p$ is true, my "reflecting" his credence in accordance with EXPERT REFLECTION would inevitably skew my credence downwards. And once I lower my credence for $p$ in order to reflect Bill's credence, I will be even *more* confident that Bill has a credence of 0 for $p$, and I will have to lower my credence again, prompting yet greater confidence that Bill's credence is 0 and calling for yet another decrease in my credence for $p$. This process will continue indefinitely: given the extreme way in which Bill's expertise is skewed, the only credences that stably satisfy EXPERT REFLECTION in this case are 0 and 1.[17] But clearly, rationality does not require me in this case to be perfectly confident in either $p$'s truth or falsity. Thus, EXPERT REFLECTION is false. At best, EXPERT REFLECTION is true only in cases where someone's expertise is not skewed in a particular direction.

I suggest that there is a similar sort of skewing effect in the Informed Beauty case that gives us reason for thinking that the requirement posited by EXPERT REFLECTION does not apply. In this case, however, it is not Informed Beauty's expertise that is skewed, but what is skewed is rather the credences that Informed Beauty can have when Sleeping Beauty is awake and able to reflect his credences. For while Informed Beauty can confirm either HEADS or TAILS on Tuesday, when Sleeping Beauty is awake he can only confirm TAILS. Thus, if Sleeping Beauty is awake and is considering the expected value of Informed Beauty's credence for HEADS *right now*, the fact that he might at some point be certain that HEADS can make no difference (since he is *not* certain of HEADS right now given that Sleeping Beauty is awake), while the fact that he might currently be certain of TAILS *will* make a difference to the expected value. And this seems to give unwarranted weight to what an expert could believe right now, privileging it over information about what the same expert could believe at another point in time. Suppose that, instead of trying to reflect Informed Beauty's *current* credence, Sleeping Beauty ought to reflect Informed Beauty's average credence over his two awakenings. In this case, if the conventional halfer position is right, then Sleeping Beauty ought to think that there is a 0.5 chance that H1 is the case, in which case Informed Beauty's average credence for HEADS over his two awakenings would be 0.75 (0.5 today, and 1 tomorrow, when Sleeping Beauty is sleeping). And she also should think that there is a 0.5 chance that T1 or T2, in which case Informed Beauty's average credence for HEADS would be 0.25 (0.5 on Monday, and 0 on Tuesday).

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[17] To see this, let $c$ be my credence for $p$. Since Bill is no more or less rational or informed than me on the condition that $p$ is true, my best guess for his credence for $p$ given the truth of $p$ will simply be my own credence for $p$, i.e. $c$. And given the falsity of $p$, his credence for $p$ will of course be 0. Since I need to weight each of these two possibilities by my credence for them, the expected value that I will have for Bill's credence for $p$ will be $c \cdot c + (1-c) \cdot 0$, or $c^2$. Since EXPERT REFLECTION requires that my credence be equal to the expected value of the credence I think an expert would have, in this case EXPERT REFLECTION would require that $c = c^2$. The only credences that satisfy this constraint are 0 and 1.

Weighting these values by their probability gives us an expected value for Informed Beauty's average credence for HEADS over the two days of $0.5 \cdot 0.75 + .5 \cdot 0.25 = 0.5$. And since 0.5 is of course Sleeping Beauty's credence for HEADS, she satisfies the demand that her credences be equal to the expected value of an expert's average credence throughout the time range that Sleeping Beauty might currently inhabit. The thirder position does not similarly satisfy this demand.

Clearly, more must be said in order to articulate a corrected "expert reflection" principle, and to determine whether this principle vindicates the halfer or thirder position. I think, though, that enough has been said to significantly blunt any worries that may have resulted from the realization that the halfer position is in tension with EXPERT REFLECTION.

## 6. Conclusion

I have argued that the highly intuitive reasoning behind the halfer solution to the Sleeping Beauty problem also leads to counterintuitive perspectivalist results. Halfers who continue to stand by this reasoning must affirm that the Informed Beauty case involves a failure of EXPERT REFLECTION and that the multiple Beauties case involves a failure of MODEST PROPORTIONALITY, and therefore must maintain that the weight one gives to another person's perspective can rationally come apart from one's estimation of that person's epistemic credentials. While these counterintuitive results may appear to constitute a significant objection to the halfer position, I have attempted to show that we have good reasons for thinking that MODEST PROPORTIONALITY and EXPERT REFLECTION do in fact fail in the cases described. But whether or not one finds my diagnoses of the cases convincing, I hope to have at least demonstrated that there is a rather surprising connection between the debate concerning the Sleeping Beauty Problem and the apparently orthogonal debate concerning the epistemic significance of disagreement: halfers are committed to robust perspectivalism and therefore must deny MODEST PROPORTIONALITY, a principle that plays an important role in both conciliatory and non-conciliatory approaches to disagreement.

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