Sensitivity Actually*

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Abstract

A number of prominent epistemologists claim that the principle of sensitivity "play[s] a starring role in the solution to some important epistemological problems" (DeRose 2010: 161; also Nozick (1981)). I argue that traditional sensitivity accounts fail to explain even the most basic data that are usually considered to constitute their primary motivation. To establish this result I develop Gettier and lottery cases involving necessary truths. Since beliefs in necessary truths are sensitive by default, the resulting cases give rise to a serious explanatory problem for the defenders of sensitivity accounts. It is furthermore argued that attempts to modally strengthen traditional sensitivity accounts to avoid the problem must appeal to a notion of safety—the primary competitor of sensitivity in the literature. The paper concludes that the explanatory virtues of sensitivity accounts are largely illusory. In the framework of modal epistemology, it is safety rather than sensitivity that does the heavy explanatory lifting with respect to Gettier cases, lottery examples, and other pertinent cases.

1 Sensitivity and Its Motivation

Robert Nozick (1981: 179ff.) introduced us to the following property of beliefs that is nowadays widely known as *Sensitivity*:

(SEN) S sensitively believes that p via method $M =_{df}$
[if p were false, then S wouldn't believe p via M].

According to Nozick and other sensitivity theorists, sensitivity is entailed by knowledge:

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(K-SEN) Necessarily, S knows p via method M only if:
[if p were false, then S wouldn't believe p via M].

(K-SEN) is, on the face of it, well-motivated. It allows us to give an explanation of our intuitions in certain central cases in epistemology. Keith DeRose (2010), for instance, argues that sensitivity-based accounts of knowledge allow us to account for Gettier cases, lottery examples, and our (alleged) failure to know the negations of sceptical hypotheses.[1] To prepare the ground for my later criticism of sensitivity theories, let us briefly consider each of these data points in some detail.

First, a Gettier case. Hannah switches on her television on a Sunday afternoon and starts watching the Wimbledon men's final. Unbeknownst to her, the BBC has suspended live broadcasting a while ago due to a technical fault. Instead of this year's men's final, the BBC is broadcasting last year's men's final. As Hannah sees Federer win a match point on her television set, she shouts out to her wife Sarah, who is in the garden:

(1) Hannah: 'Federer just won the men's final!'

As it happens, Federer has in fact just won the men's final, repeating last year's feat. Given the facts of our little story, Hannah has a well-justified true belief that Federer just won the men's final, but she intuitively (we may grant) doesn't know that proposition. What accounts for the fact that Hannah doesn't know, despite the fact that she has a well-justified true belief? The sensitivity theorist claims to have a straightforward explanation of this datum: Hannah's belief as expressed by (1) is *not sensitive*. To see this, note that if Federer hadn't just won the men's final, Hannah, who is watching a replay of last year's final, would still believe that he did. Given (K-SEN), Hannah doesn't know (1) because her belief that (1) is not sensitive.

Besides offering an account of Gettier cases, sensitivity theorists claim that their view provides us with a compelling explanation of our (apparent) failure to know lottery propositions.[2] Consider (2), as uttered by Omar after the final draw of the lottery, but before the results have been announced:

(2) Omar: 'My lottery ticket is not a winner.'

[1]DeRose (2010) is more cautious about the entailment relation but also subscribes to the view that sensitivity can explain our intuitions in the cases mentioned. See Section 5 for a detailed discussion of DeRose's views. Other defenders of sensitivity include (Adams and Clarke 2005; Cross 2010).

[2]I say 'apparent' because I have argued elsewhere (Blome-Tillmann 2014: chs. 5.2-3) that we sometimes know lottery propositions.

Intuitively (we may grant), Omar doesn't know that his lottery ticket is not a winner. For all Omar knows, his ticket could be the one ticket that cracks the jackpot.[3] What explains our intuition that Omar doesn't know (2), despite the fact that he has an extremely strong epistemic justification for his true belief that (2)? According to the sensitivity theorist, the puzzle is again solved by (K-SEN). Omar doesn't know (2) because his belief that (2) isn't sensitive: if Omar's ticket were a winner, Omar would (falsely) believe that it's not a winner. Thus, with respect to our beliefs in lottery propositions, the condition in (K-SEN) isn't satisfied. That is why, the sensitivity theorist argues, we cannot know lottery propositions.

A third and final datum presented in support of sensitivity accounts is our (apparent) failure to know sceptical hypotheses.[4] Consider Kayla's utterance in (3):

(3) Kayla: 'I'm not a brain in a vat.'

The sensitivity-based explanation of our intuitions in this case is again fairly straightforward. Kayla doesn't know that she is not a brain in a vat because her belief that she is not a brain in a vat is insensitive. For if Kayla were a brain in a vat, she would (falsely) believe that she is not a brain in a vat. Given (K-SEN), it follows that Kayla's belief in (3)—and our beliefs in sceptical hypotheses more generally—cannot be knowledge.

It is due to the apparent ease with which sensitivity theorists can account for the above data that the view has seemed attractive to many epistemologists. However, while sensitivity accounts of knowledge are, on the face of it, explanatorily quite powerful, they have also been subject to severe criticism in the literature. As philosophers as illustrious as Kripke (2011), Sosa (1999: 141-142), and Williamson (2000: 117, also ch. 7) have argued, (K-SEN) rather implausibly leads to closure failure and, as Sosa (1999: 145) and Vogel (1987) have claimed, to the impossibility of second-order knowledge. In addition, a number of theorists, most prominently Hawthorne (2004: 10-11), Schiffer (1996: 331), Sosa (1999: 145-146), and Williamson (2000: 158-161) have produced counterexamples to (K-SEN). In light of these objections, sensitivity theorists such as DeRose (1995, 2010), Adams and Clarke (2005), Cross (2010), Roush (2007), and others have aimed to revise and refine their accounts. The success and limitations of those revisions shall not be the topic of this paper.[5] Instead of adding further epicycles to the discussion of

[3] Hence the trademarked slogan of the New York Lottery: 'You never know!'

[4] Cp. fn. 2. I have argued elsewhere, in (Blome-Tillmann 2014: ch. 5.2; 2015), that we sometimes know the negations of sceptical hypotheses.

[5] But see below for a discussion of Cross's and DeRose's recent accounts.

the above problems, I shall aim right at the heart of sensitivity theories and dispute that (K-SEN) and its variants can account for any of the data that sensitivity theorists have produced in its support. Thus, if I am right, then the primary motivation for a sensitivity theory is undermined and we are left with nothing but the familiar downsides of the view identified by Kripke, Sosa, Williamson, and others.

2 Ignorance of Necessary Truths

It is a familiar fact that all beliefs in necessary truths are sensitive by default. To see this let us reformulate (SEN) in terms of possible worlds (assuming the standard Stalnaker-Lewis semantics for counterfactual conditionals):

(SEN′) S sensitively believes that p via method $M =_{df}$
[in the closest $\neg p$-worlds, S doesn't believe p via M].

Next, note that if p is necessary then there are no $\neg p$-worlds and thus no closest $\neg p$-worlds in which S (falsely) believes p. The sensitivity condition is, therefore, trivially satisfied with respect to necessary truths:

(NST) Necessarily, all beliefs in necessary truths are sensitive.[6,7]

As we shall see below, this feature of beliefs in necessary truths spells trouble for the sensitivity theorist, as it allows us to construe examples of sensitive beliefs that resemble the examples from Section 1 in all relevant respects. In the envisaged cases, however, the explanation that our subjects fail to know because their beliefs are insensitive is clearly unavailable, thus raising serious doubts as to whether the sensitivity theorist's explanation of our initial cases is satisfactory.

To see in more detail what I have in mind, consider the fact that, as David Lewis (1970: 185) has pointed out, the operator 'actually' in the English language is ambiguous between a primary sense, on which it acts as an indexical, referring rigidly to the world in which it is uttered, and a secondary sense

[6]Nozick (1981: 176) himself was well aware of this consequence of his view, which is why he added a second modal condition to his analysis of knowledge. 'Adherence' is the constraint that, if p were true, S would believe that p. Adherence shall not concern us further in this paper.

[7]Roush (2012: 246) is also aware of the issue, claiming that: "Necessary truths are different from empirical truths [. . .] so it should be no surprise if the kind of responsiveness we should expect for knowledge of logical truths and other necessary truths takes a different form." However, the dichotomy between necessary and empirical truths is a false one and I shall exploit this fact in creating trouble for the sensitivity theorist below.

on which occurrences of the word are effectively redundant. Let us focus on the primary sense of 'actually' in what follows. Consider the proposition expressed by Hannah's utterance in (4) in the previously described Gettier case:

(4) Hannah: 'Federer actually just won the men's final!'

On Lewis's primary reading of 'actually', Hannah's utterance in (4) expresses the same proposition as her (less idiomatic) utterance in (5):

(5) Hannah: 'In the actual world, Federer just won the Wimbledon men's final.'

The proposition Hannah expresses in (5), however, is a necessary truth. It is necessarily true that, in the world that Hannah refers to as 'the actual world', Federer just won the men's final. To illustrate this further call the world Hannah refers to with the term 'the actual world' @. Then, since Federer won in @, it is necessarily true that Federer won in @. It is, in other words, true in all worlds w that Federer won in @.

If Hannah's utterance in (4) expresses a necessary truth, however, then given (NST), the belief that she expresses in uttering (4) must be sensitive. But if Hannah's belief as expressed in (4) is sensitive, then the sensitivity theorist doesn't have an explanation of why Hannah's belief in (4) fails to be knowledge. Consequently, the sensitivity theorist can explain why Hannah fails to know (1)—that Federer just won the men's final—but she cannot explain why Hannah fails to know (4)—that Federer actually just won the men's final. I take it that this result is, if unavoidable, a rather serious embarrassment for the sensitivity theorist, for one would hope that a successful explanation of the former datum be equally applicable to the latter.

An analogous objection can be made to the sensitivity theorist's account of Omar's lottery utterance. By inserting the 'actually'-operator into (2) we obtain (6), which, in Omar's mouth, expresses the same proposition as in (7):

(6) Omar: 'My lottery ticket is actually not a winner.'

(7) Omar: 'In the actual world, my lottery ticket is not a winner.'

Just as in Hannah's case, the proposition expressed by Omar's utterances in (6) and (7) is a necessary truth. Thus, the belief that Omar expresses by means of (6) and (7) is sensitive. Consequently, the sensitivity theorist has an explanation of why Omar fails to know (2)—that his lottery ticket is not a winner—but not of why he fails to know (6)—that his lottery ticket is actually not a winner. Analogous reasoning applies to Kayla's case and her failure to know that she isn't a brain in a vat. I shall spare the reader the details.

The problem can be illustrated in a more schematic way. Let 'p' range over the propositions believed by our subjects in (1)-(3) and let '$@p$' stand for their 'actualized' counterpart propositions. Then, according to the sensitivity theorist, our subjects fail to know p because their beliefs that p aren't sensitive. But the same explanation doesn't apply to their beliefs that $@p$. Since $@p$ is a necessary truth, beliefs that $@p$ are sensitive by default. Consequently, the rather obvious fact that Hannah, Omar, and Kayla fail to know $@p$ cannot be explained by means of (K-SEN).

Such an explanatory discrepancy between the two types of cases is rather surprising. The phenomenology of each case is, after all, rather similar, if not identical. Intuitively, our subjects fail to know both p and $@p$ *for the same reason*—namely, because the beliefs at issue are true as a matter of luck. Our subjects 'lucked out', as it were, in believing truly. But if our subjects' beliefs that $@p$ fail to be knowledge for the same reasons as their beliefs that p, then the sensitivity principle must be unsuccessful in explaining what is really going on in Gettier cases, lottery examples, and cases of ignorance of sceptical hypotheses. As a consequence, (K-SEN) fails to capture the sense of epistemic luck that is incompatible with knowledge and therefore cannot do the explanatory work it was designed to do.

Before moving on, let us consider some potential responses by the sensitivity theorist. To begin with, note that appeal to the notion of a belief-forming method cannot resolve the explanatory problem uncovered by the above examples. For the problem is, as (K-SEN′) illustrates, that the sensitivity principle urges us to consider what the subject believes, by whichever methods, *in the closest worlds in which her belief is false.* The problem, however, is precisely that there are no such worlds, and not that the belief-forming method has been specified inappropriately.

According to a second response, the above objection is based on a flawed semantics of the natural language term 'actually'.[8] (Stephanou 2010) and (Yalcin 2015), for instance, have argued recently that the natural language expression 'actually' isn't an operator that refers rigidly to the world of the context of utterance. However, nothing much in the above argument rests on the semantics of the natural language term 'actually'. If Stephanou and Yalcin are right, we can reformulate the above examples by means of the technical operator '@', which we then define stipulatively to have the seman-

[8]Thanks to an anonymous referee for pointing out this issue.

tics that Lewis thought 'actually' has on its primary reading. Such a move might be taken to give rise to further worries, however. For instance, the defender of sensitivity might argue that the proposition expressed by '$@p$' thus defined cannot be believed by ordinary epistemic subjects or that, despite appearances, we in fact know that $@p$, even though we fail to know p. I shall not investigate further these responses.

Instead, note that largely equivalent difficulties to the ones described above arise entirely independently of the semantics of '@' or 'actually'—namely, from disjunction introduction. We can, after all, turn any contingent truth into a necessary truth by introducing a necessary disjunct. Consider (8):

(8) Hannah: 'Federer just won the men's final or 4657 is a prime number.'

If Hannah has no idea whatsoever whether or not 4657 is a prime number, then her belief in (8) is, in the epistemic sense at issue here, true as a matter of luck (she bases her belief solely on her watching a broadcast of last year's final). However, in (8) Hannah believes a necessary truth and her belief is, therefore, sensitive by default. But, surely, what explains the fact that Hannah doesn't know (1)—that Federer just won the men's final—should, in the envisaged case, also explain why Hannah doesn't know (8)—that Federer just won the men's final or 4657 is a prime number. But since the sensitivity theorist cannot explain the latter, it is again doubtful whether her attempted explanation of (1) is uncovering the true reasons for Hannah's ignorance.

A third and final response to be mentioned here rejects the assumption underlying the above argument that counterpossibles—that is, counterfactuals with impossible antecedents—are trivially true. Such a view can be modeled semantically by introducing impossible worlds into one's semantics.[9] Impossible worlds analyses of counterfactual conditionals, however, are controversial.[10] Suffice it to say here that embracing such an unorthodox account of counterfactuals comes at a significant cost to the sensitivity theorist. I shall, therefore, ignore the matter for the moment and return to the issue of impossible worlds in Section 6.

3 Safety

If the sensitivity theorist wants her principle to account for all of the data arising from Gettier cases, lottery examples, and sceptical hypotheses, she

[9] Miller (ms) is attracted to such a view.

[10] See, for instance, (Stalnaker 1996; Williamson 2007: ch. 5.6).

must replace (K-SEN) with a principle that avoids the abovementioned problems. To see what such an amended principle could look like, let us consider briefly how *safety* theorists have responded to the threat of our ignorance of necessary truths. To begin with, consider a standard formulation of the safety principle that is due to Ernest Sosa (1999: 146):[11]

(SAFE) S's belief that p is safe $=_{df}$ [if S were to believe p, then p].

According to (SAFE), a belief is safe iff it couldn't have been false easily. In other words, one's belief that p is safe just in case one believes p in a nearby world w only if p is true in w. In analogy to sensitivity theorists, safety theorists believe that safety is a property of knowledge:

(K-SAF) Necessarily, S knows p only if [if S were to believe p, then p].[12]

Next, note that—again, analogously to the case of sensitivity—any belief in a necessary truth is safe by default. This is so because one's belief that p cannot be false in nearby $\neg p$-worlds, if—as is the case if p is necessary—there are no $\neg p$-worlds:

(NSF) Necessarily, all beliefs in necessary truths are safe.

As is familiar from the literature on safety, this property of safety as formulated in (Sosa 1999) leads to the undesirable result that the safety theorist cannot explain why we sometimes fail to know necessary truths. Consider a somewhat drastic example in which Will has based his belief in (9) solely on the testimony of his wildly unreliable guru:[13]

(9) Will: '4657 is a prime number.'

Intuitively, Will doesn't know (9), despite the fact that his belief in (9) is safe on the above definition.[14]

In response to this problem safety theorists such as Pritchard (2007a: 292, 2007b: 40, 2009: 34) and Williamson (2000: 147, 2009: 23) have proposed alternative formulations of the safety principle. Instead of going into the exegetical details, however, consider the following definition, which captures the spirit of Pritchard's and Williamson's accounts with sufficient accuracy for the purposes at hand:[15]

[11] For an excellent overview of the current debate on safety see (Rabinowitz 2014).

[12] See, for instance, (Sosa 1999). Note also that (K-SAF) can provide an explanation of why Hannah and Omar fail to know (1) and (2), but not of why Kayla (seemingly) fails to know (3). The explanatory virtues of safety shall not concern us further in this paper.

[13] Cp. (Williamson 2009: 23).

[14] Of course, the sensitivity theorist will not be any better off with respect to this example.

[15] Williamson (2000: 147) formulates his version of as follows:

(SAFE′) S's belief that p (via method M) is safe $=_{df}$
[S couldn't easily have formed a false belief (via M)].

(SAFE′) resolves the problem of accounting for Will's ignorance in an elegant way. Since Will's belief-forming method is hopelessly unreliable, he could very easily have formed a false belief by applying it. His unreliable guru, for instance, could have easily told him that 4659 is a prime number or that 15 is. Given (SAFE′), beliefs in necessary truths are no longer safe by default. To the contrary, one's belief in a necessary truth is only safe if one's belief-forming method doesn't lead to falsity in nearby worlds.

Moreover, note that (SAFE′) can explain Hannah's and Omar's ignorance in our examples from Section 2 in a rather elegant way. To see this, note that if Hannah comes to believe that Federer actually just won the men's final by watching a BBC broadcast, then there is a nearby world in which (a) Federer hasn't just won and (b) Hannah comes to believe, by watching a BBC broadcast, that he did just win. Thus, Hannah could have easily come to believe a contingent falsehood by method M, and her belief is, therefore, not safe. Analogous considerations apply to Omar's lottery case. If Omar comes to believe that his ticket is actually not a winner by calculating the odds, then there is a nearby world in which (a) Omar's ticket is a winner and (b) Omar comes to believe, by calculating the odds, that his ticket is not a winner. Again, Omar could have easily come to believe a contingent falsehood and his belief is, therefore, not safe.

Before moving on, let me formulate the above points schematically. In Gettier and lottery examples, if S believes $@p$ via method M, then there is a nearby world w in which (a) p is false and (b) S believes p via method M.

(W1) If one knows, one could not easily have been wrong in a similar case.

In his (2009: 23), Williamson illustrates this view further by arguing that "knowing p requires safety from the falsity of p and of its epistemic counterparts." Here is a principle capturing the notion:

(W2) S's belief that p is safe $=_{df}$
1. [if S were to believe p, then p] and
2. [if S were to believe one of p's epistemic counterparts p^*, then p^*].

It is also noteworthy that Williamson (2000: ch. 7.4) is opposed to the use of belief-forming methods in epistemology and therefore wouldn't accept (SAFE′). Finally, note that if p is an epistemic counterpart of itself, condition 1 in (W2) is strictly speaking redundant.

Pritchard (2007a: 292, 2007b: 40, 2009: 34) defines safety as follows: "S's belief is safe iff in most near-by possible worlds in which S continues to form her belief about the target proposition in the same way as in the actual world, and in all very close near-by possible worlds in which S continues to form her belief about the target proposition in the same way as in the actual world, the belief continues to be true." For a predecessor of this definition, see (Pritchard 2005: 163).

Thus, S could have easily come to believe a contingent falsehood by method M, and her belief is, therefore, not safe. More sophisticated safety theorists such as Pritchard and Williamson have, as a consequence, an elegant and convincing story to tell about our tuned-up Gettier and lottery cases from Section 2.[16]

4 Safe Sensitivity

Given the ease and elegance with which more sophisticated safety principles avoid the problem of necessary truths, the question arises whether the sensitivity theorist can simply adopt some of the safety theorists' apparatus for her own purposes. Since both theories place modal constraints on knowledge, such an idea is, on the face of it, rather plausible. But how could the sensitivity theorist piggyback on the safety theorists' solution? The obvious suggestion, in light of (SAFE′), is what I shall call the principle of *safe sensitivity*:

(SFSN) S's belief that p (via method M) is *safely sensitive* $=_{df}$
[S couldn't easily have formed an insensitive belief (via M)].

In terms of possible worlds, this principle demands not only that one's actual belief that p be sensitive, but also that all those beliefs that were formed by the same method in nearby worlds be sensitive. In other words, one's belief that p is safely sensitive iff one's belief-forming method leads to sensitive beliefs in nearby worlds.

With the notion of safe sensitivity in place, the defender of a sensitivity account of knowledge can finally avoid the troubles from Section 2 by simply admitting that knowledge requires more than classical sensitivity—namely, the stronger condition of safe sensitivity:

(K-SFSN) Necessarily, S knows p (via method M) only if:
[S couldn't easily have formed in insensitive belief (via M)].

It should be fairly obvious how this principle avoids the problematic consequences of the classical formulations of sensitivity. Let me illustrate the matter schematically first. If S in the examples from Section 2 believes $@p$ by method M, then there is a nearby world w in which (a) S believes p by means of M and (b) S's belief that p is insensitive. Thus, the condition

[16] (SAFE′) cannot account for the (alleged; cp. fn. 4) datum that Kayla fails to know that she is not a brain in a vat. However, note again that the explanatory virtues of safety are not the topic of this paper.

explicated in (K-SFSN) isn't satisfied in the relevant examples and S's belief that $@p$ isn't safely sensitive. The defender of (K-SFSN) has an explanation of why S doesn't know $@p$.

Next, consider the Wimbledon Gettier case. If Hannah believes that Federer actually won by watching the BBC, then there is a nearby world w in which (a) Hannah believes that Federer won by the same method and (b) Hannah's belief that Federer won by that method is insensitive. This is the case, for we already saw that Hannah's belief that Federer won is insensitive. Finally, Omar's lottery case. If Omar comes to believe that his ticket is actually not a winner by calculating the odds, then there is a nearby world in which (a) Omar comes to believe, by calculating the odds, that his ticket isn't a winner and (b) Omar's belief that his ticket isn't a winner is insensitive. Again, the condition in (K-SFSN) isn't satisfied in the lottery case from Section 2 and Omar doesn't know that his ticket is actually not a winner. Analogous considerations apply to Kayla's case but I shall spare the reader the details.

Is all hunky-dory for the sensitivity theorist after all? It isn't. Accepting (K-SFSN) comes at a significant cost for the sensitivity theorist. (K-SFSN) is, after all, at best an impure or hybrid sensitivity account, merging the two competing notions of safety and sensitivity. To see this, note that while the original safety account (SAFE′) demands safety *from falsehood*, our novel hybrid account demands safety *from insensitivity*. So understood, safe sensitivity is more of a variant of safety than a variant of sensitivity, for the main explanatory work in (K-SFSN) with respect to Gettier cases and lottery examples is still done by the notion of safety.

To see this in more detail, note that in Gettier cases and lottery examples the subject's beliefs fail to be safely sensitive—that is, there are nearby worlds in which the subject's beliefs are insensitive.[17] The relevant worlds in which the subject's beliefs are insensitive, however, are crucially worlds in which the subject's beliefs are false. Thus, in the relevant nearby worlds, the subject's beliefs are trivially insensitive—namely, solely in virtue of being false.[18] If that is so, however, then the relevant beliefs in Gettier cases and lottery examples fail to be safely sensitive only in virtue of being unsafe (false in nearby worlds). It should be clear by now that what really does the work with respect to Gettier cases and lottery examples is safety rather than safe sensitivity. What would be needed in order to motivate safe sensitivity over

[17]For the sake of readability I drop relativization to belief-forming methods in this paragraph.

[18]False beliefs are necessarily insensitive: if, in w, you believe falsely that p, then the closest world to w in which $\neg p$ is w itself. Sensitivity, however, demands that you not believe p in w. Since you do, your belief is not sensitive.

and above the simpler safety condition are Gettier cases or lottery examples in which the subject believes truly in all nearby worlds, but insensitively in some. In the absence of such examples there is precious little reason to prefer (K-SFSN) over the simpler (K-SAF).

Could we develop an alternative account of sensitivity that avoids the problem of necessary truths in a different way—that is, without resorting to safety? It is hard to see how alternative approaches could proceed within the framework of a modal epistemology. For it should be clear from the above discussion that in order to avoid the counterexamples from Section 2 we must include in our modal analysis nearby worlds in which the subject believes different, contingent propositions. Without the inclusion of such nearby worlds, a sensitivity constraint on knowledge will always be satisfied trivially in cases of beliefs in necessary truths. However, the inclusion in one's analysis of nearby worlds in which the subject believes differently amounts to nothing but the acceptance of a safety constraint as explicated by Williamson and Pritchard.[19]

5 Alternative Versions of Sensitivity

Many readers will be convinced at this point that sensitivity cannot be salvaged from the above objections. Those readers can skip what follows and move straight to the conclusion. For those who insist on a detailed demonstration that alternative versions of sensitivity in the literature are also subject to my objection, I shall discuss, in this section, accounts proposed by Kelly Becker (2007), Troy Cross (2010), Keith DeRose (2010), Sanford Goldberg (2012), and an account inspired by Sherrilyn Roush's (2007).

5.1 Cross's Account

To begin with, consider a principle proposed by Cross (2010: 49):

(RS) Necessarily, S knows p only if: [there is a true proposition q such that:

1. q entails p,
2. S believes p on the basis of q, and

[19] Note also that adding unrelated, non-modal constraints that can explain the mentioned data would amount to the admission that sensitivity cannot really account for the data emerging from Gettier cases, lottery examples, and the negations of sceptical hypotheses.

3. S would not have believed q, had p been false].[20]

Cross eventually rejects (RS) and gives up on sensitivity in favour of a non-modal principle accounting for knowledge in terms of the notion of an explanation. However, it is worthwhile discussing (RS) in some detail.

To begin with, note that (RS) seems, on the face of it, to commit us to an implausibly strong form of foundationalism about knowledge. It seems rather implausible that, for every p we know, we believe that p on the basis of a q that *entails* p. For, surely, sometimes we know a proposition p even though our belief that p is based on a q that doesn't entail p. Inductive knowledge seems to fall into this category. Secondly, note that in cases of basic knowledge, we know a proposition p without basing our belief that p on any other belief, let alone on a proposition that entails p. My knowledge that I'm not in pain right now presumably falls into this category.

Cross (2010: 49) is aware of these worries and aims to address them by allowing for the condition in (RS) to be satisfied when p=q and by interpreting the notion of *believing on the basis of* in (RS) in counterfactual, rather than causal terms:

> I have said nothing so far about "believing on the basis of" and I will not say much, because I want to leave (RS) as flexible as I possibly can. But counterfactuals will be a rough guide. If S believes p on the basis of q, then if S didn't believe q, S wouldn't believe p. This dependence needn't be causal, because p and q needn't be distinct. I want to leave it open that p=q. (2010: 49)

But note firstly that this response does not resolve the problem of inductive knowledge, for inductive knowledge is precisely not based on itself. Secondly, note that if we allow for the identity of p and q and we understand the notion of belief-basing in Cross's counterfactual, non-causal way, then the classical sensitivity principle (K-SEN) from Section 1 entails (RS). To see this, note that if we allow that p=q, then condition 1 of (RS) is always trivially satisfied. But so is condition 2, given Cross's counterfactual account of *believing on the basis of*: surely, if S didn't believe p, S wouldn't believe p. That leaves us with condition 3. Given that p=q, however, that condition is straightforwardly equivalent to the ordinary sensitivity condition (SEN) familiar from Section 1.[21] Thus, the classical formulation of sensitivity (K-

[20] Here is Cross's (2010: 49) original formulation: "Necessarily, if S knows p then, for some true proposition q: q entails p, S believes p on the basis of q, and S's belief that q is sensitive to the truth of p."

[21] For the sake of simplicity I'm ignoring the reference to methods in (K-SEN) here. (RS) could be reformulated accordingly, but not without making the principle more cumbersome.

SEN) from Section 1 entails (RS) as interpreted by Cross: any belief that is classically sensitive is also (RS)-sensitive. But if that is so, then Cross's approach inherits all the explanatory weaknesses of (K-SEN) with respect to our objections from Section 2. Since the condition in (K-SEN) is satisfied in our amended Gettier and lottery cases in Section 2, so must be the condition in (RS). Consequently, (RS) cannot explain why Hannah, Omar, and Kayla fail to know in their respective cases in Section 2.

What about more restrictive interpretations of (RS) than the one intended by Cross? Assume, in what follows, a causal interpretation of belief-basing and that $p \neq q$. Firstly, note that, as mentioned above, (RS) is incompatible with the possibility of both basic and inductive knowledge on such an interpretation. Secondly, note that (RS) so interpreted still remains troubled by our examples from Section 2. To see this, we merely have to assume that Omar from our earlier lottery case causally bases his belief that p on his belief that q as follows:

p: My ticket is actually not a winner.

q: The odds that my ticket is a winner are exceedingly low.

In the envisaged case conditions 1-3 of Cross's (RS) are satisfied, even on the stronger reading of (RS). To see this, note firstly that p is a necessary truth, and as such, entailed by any other proposition, including q. Secondly, by stipulation, Omar has causally based his belief that p on his belief that q. And thirdly, Omar's belief that p is sensitive to his belief that q: p is a necessary truth and one's belief that p is, therefore, sensitive to any proposition whatsoever. There is then, in Omar's case, a true proposition that satisfies all three conditions in (RS)—even if we interpret (RS) in a more demanding (and, to repeat, implausible) way than intended by Cross.

Analogous considerations apply to the remaining cases involving Hannah and Kayla. In summary, (RS) can neither account for our examples in Section 2, nor is it compatible with the possibility of genuinely inductive knowledge.

5.2 A Roushian Account

Consider next a closely related account that is inspired by Roush's (2007) identification of knowledge with belief deduced from sensitive belief:[22]

(RS′) Necessarily, S knows p only if [there is a true proposition q such that:

1. q entails p,

[22] I am indebted to an anonymous referee for suggesting the below account.

2. S believes p on the basis of q, and
3. S would not have believed q, had q been false].

The crucial difference with Cross's account is that condition 3 in (RS′) has a 'q' rather than a 'p' in its antecedent. Condition 3 is, therefore, not trivialized if p is a necessary truth.

Note, however, that (RS′) remains, despite appearances, subject to the very same problems as (RS): it commits us to an implausibly strong version of foundationalism about knowledge, as it struggles to account for inductive knowledge and the possibility of basic knowledge. Moreover, (RS′) is subject to the same counterexamples as (RS). To see this assume, again, that Omar from our lottery case bases his belief that p on his belief that q, as follows:

p: My ticket is actually not a winner.

q: The odds that my ticket is a winner are exceedingly low.

In the envisaged case, conditions 1-3 of (RS′) are satisfied: firstly, p is a necessary truth, and as such, entailed by any other proposition, including q. Secondly, by stipulation, Omar has based his belief that p on his belief that q. And thirdly, Omar's belief that q is sensitive: if the odds that his ticket is a winner weren't exceedingly low, Omar wouldn't believe that they are. Thus, there is, again, in Omar's case, a true proposition q that satisfies all three conditions in (RS′).[23]

5.3 DeRose's Account

In recent work, Keith DeRose (2010) makes two argumentative moves in defence of sensitivity. First, he claims that the odd counterexample to classical sensitivity is not a problem for his new view as he has weakened his formulation of the sensitivity principle in a way that allows for counterexamples. Here is an initial formulation of what DeRose (2010: 163) calls an "indirect sensitivity account":

(D-SEN) We tend to judge that S doesn't know that p if:
[if p were false, then S would still believe p].[24]

[23] It might be objected further at this point that it is unnatural for Omar to base his belief that p on his belief that q. In fact, it might be argued that when one believes a proposition of the form $@p$, one always does so on the basis of one's belief that p and on that basis alone. While such a constraint on the basing relation would avoid the above objection, it is hard to see why the basing relation should be constrained in such a way. The restriction is both psychologically and epistemically implausible.

[24] DeRose (2010: 163): "[W]e have at least a fairly general—though not necessarily exceptionless—tendency to judge that insensitive beliefs are not knowledge."

Now, one might wonder whether this weaker or "indirect" account can really explain the datum that we do not know in Gettier cases as opposed to the datum that we tend to judge that we do not know in Gettier cases.[25] Be that as it may, DeRose admits that while some counterexamples to classical sensitivity may not be bothersome for his new account, he would nevertheless be worried if there were further counterexamples that are similar to cases in which (D-SEN) is meant to account for our ignorance. DeRose:

> But not all counterexamples are equal. If a counterexample is in important ways similar to the cases [(D-SEN)] claims to explain, these can be especially damaging to [(D-SEN)], and can jeopardize its claim to have provided a good explanation. (DeRose 2010: 167)

According to DeRose's own criteria, our examples from Section 2 are thus "especially damaging", for they are certainly very similar to cases in which DeRose would ordinarily want to rely on (D-SEN) for an explanation of our subjects' ignorance. What is worse, I have shown in Section 2 that for any case in which (D-SEN) might seem to explain our tendency to judge that S doesn't know p, we can easily construe an example in which the explanation doesn't work—namely, one involving the proposition $@p$. Thus, it isn't merely the case that DeRose's explanation fails in somewhat exotic and construed counterexamples. Rather, the explanation doesn't work in cases that are, for all intents and purposes, just as central and epistemologically important as traditional Gettier cases and lottery examples.

DeRose's second move in defence of sensitivity is influenced by Cross's approach from the previous section. Here is the principle endorsed by DeRose (2010: 177-178):

(RI) We tend to judge that S doesn't know that p when there is no q such that:

1. S believes q,
2. q is, for S, a ground for p, and
3. S would not have believed q, if p had been false.

Similar objections to Cross's approach can be raised in response to (RI). To begin with, note again that not all knowledge is based on other beliefs. Some knowledge is basic. And again, if we interpret the notion of a *ground for belief*

[25] It should also be noted that the datum is not merely that we 'tend' to judge that we do not know in Gettier cases. The empirical data are really quite clear on the issue. See, for instance, (Nagel et al. 2013).

in a counterfactual, non-causal way that allows for p to be its own ground, then (K-SEN) entails (RI) for effectively the same reasons as in Cross's case: conditions 1 and 2 in (RI) are, on such an interpretation, trivially satisfied and condition 3 collapses into the classical sensitivity condition.

Secondly, note again that if we interpret the grounding relation in a more substantive, causal way, then (RI) is still subject to the counterexamples from Section 2. Let me illustrate the matter this time by means of the Wimbledon case. Instantiate p and q as follows and assume that Hannah's belief that p is grounded in her belief that q:

p: Federer actually just won the men's final.

q: I just saw Federer win the men's final on TV.

Then, first, in our case Hannah believes q; second, q is, for Hannah, a ground for believing p (Hannah believes p because of her believing q); and, third, Hannah's belief that q is sensitive to p: since p is a necessary truth, Hannah's belief that q is sensitive to p by default. Analogous reasoning applies to Omar's and Kayla's cases, but I shall spare the reader the details.

In summary, neither DeRose's indirect sensitivity account nor his variant of Cross's (RS) allow him to escape our objections from Section 2. Sensitivity remains unable to account for the data emerging from 'actualized' Gettier cases, lottery examples, and cases of alleged ignorance of sceptical hypotheses.

5.4 Goldberg's Account

Next, consider an account that is due to Sanford Goldberg (2012). Goldberg proposes the following principle:[26]

(G) Necessarily, S knows p (via method M) only if:
[were M to yield a false proposition, q, as its output, then S would not employ M in belief-formation (and so wouldn't come to believe that q via M)].

While Goldberg labels his view as a version of a sensitivity account of knowledge, (G) is in spirit much closer to—if not identical to—the safety account discussed in Section 3:

[26] Goldberg (2012: 52): "S knows that p (via method M) only if the following condition holds: if M were to yield a false proposition, q, as its output, then S would not employ M in belief-formation (and so would not come to believe that q via M)."

(KSAFE′) Necessarily, S knows p (via method M) only if:
[S couldn't easily have formed a false belief (via M)].

Thus, while Goldberg's view can presumably account for the actualized Gettier cases and lottery examples presented in Section 2, it can only do so in virtue of abandoning sensitivity in favour of safety.

5.5 Becker's Account

Finally, consider Kelly Becker's (2007) account, which consists in the addition of a process reliabilist condition to the familiar sensitivity condition:

(B-SEN) Necessarily, S knows p via method M only if:

1. If p were false, then S wouldn't believe p via M.
2. M produces a high ratio of true beliefs in the actual world and in most nearby possible worlds.

(B-SEN) doesn't provide us with a way out of the predicament generated by our examples in Section 2. Those examples showed that sensitivity cannot explain certain data. Pointing out that an alternative view—process reliabilism—that we may tag on to a sensitivity account can is beside the point. Moreover, note that if process reliabilism could account for actualized Gettier cases and lottery examples, then surely it would also be able to do so in standard, non-actualized Gettier cases and lottery examples, thus rendering the sensitivity condition in (B-SEN) redundant. Finally, it should be noted that process reliabilism fails to offer a suitable response to Omar's lottery example from Section 2: Omar's belief forming method—believing that his ticket is actually not a winner on the basis of the probabilities—produces a high ratio of true beliefs in the actual world and in most nearby worlds.

6 Conclusion

Contrary to what is sometimes assumed in the literature,[27] the fact that beliefs in necessary truths are sensitive by default creates a serious problem for the defenders of traditional sensitivity accounts. Necessary truths are not, as some authors have suggested, different from contingent empirical truths in a way that would allow us to isolate the cases and provide a separate

[27]See (Roush 2012). DeRose doesn't, to the best of my knowledge, address the problem of our ignorance of necessary truths.

explanation of our knowledge (and ignorance) of necessary truths. Traditional sensitivity accounts are, as a consequence, struggling to successfully explain the very data that are usually considered to provide their primary motivation: bar the acceptance of an impossible worlds semantics for counterfactual conditionals—a price few will be willing to pay—it is hard to see what could resolve the problem for the sensitivity theorist. Finally, I have shown that attempts to modally strengthen traditional sensitivity accounts in order to avoid the problem must appeal to the notion of safety—the primary competitor of sensitivity in the literature. I thus conclude that, given the ease with which safety accounts resolve the difficulties discussed in this paper, we should let safety rather than sensitivity take centre stage in modal epistemology.

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